

ROADS AND STREETS

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ROTO WING
uses **TIMKEN BEARINGS**
FOR SPEED AND DEPENDABILITY

In snow removal SPEED is all-important. The Roto Wing snow plow is designed and built to cut back snow banks 5 feet beyond the shoulders of the road at speeds ranging from 10 to 20 miles per hour, depending upon the depth of the snow.

This is accomplished by a combination of mouldboard and a triple-bladed rotor mounted on Timken Tapered Roller Bearings. The rotor is suspended over the ditch line and it and its bearings are subject to considerable strain as well as severe radial, thrust and shock loads due to the varying density of the material—snow, ice, etc., encountered by the rapidly-revolving blades.

Roto Wing snow plow equipped with Timken Bearings clearing the runways of an Army airfield. These machines are used extensively on United States and Canadian airfields.

However—to quote from a letter received from Mr. Mather Garland, Chief Engineer of Roto Wing Company, Mound, Minnesota, "The past 6 years of experience has proven to us that Timken Bearings can take it and we are pleased to advise that your bearings give very excellent service."

You need this kind of bearing service in your equipment—be what it may. To make sure of getting it, see that the trade-mark "TIMKEN" appears on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



...YOU GET THEM ALL IN ADAMS!

★ Judged by any standards you like—power plant, engineering design, construction—Adams Motor Graders are unsurpassed in the three fundamental respects which, more than any others, determine efficient, profitable operation . . . *abundant power, long-life dependability, operating economy.*

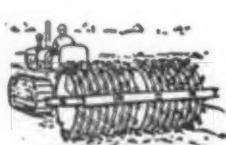
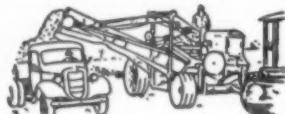
Take the husky International Diesel engines used in Adams Graders—they're *long* on power and dependability, *low* on fuel consumption! . . .

Most heavy-duty Adams Graders—even on the toughest jobs—operate on two gallons or less of low-priced Diesel fuel per hour.

Structurally, Adams Motor Graders have the rugged strength and rigidity to withstand hard usage. Add to this Adams' in-built adjustments for taking up wear at all critical control points, and you have a combination of dependability and economy that guarantees long years of efficient, low-cost operation.

See your nearby Adams dealer for full details and the other advantages of Adams machines.

ASK YOUR DEALER ABOUT THESE MACHINES



J. D. ADAMS MANUFACTURING CO.
INDIANAPOLIS, INDIANA

Adams

ROAD-BUILDING AND
EARTH-MOVING EQUIPMENT

GUA
¾-in.,
durab
Bethle
Beam,
12 ft.,
Pro
Post
or su
Highw
steel,
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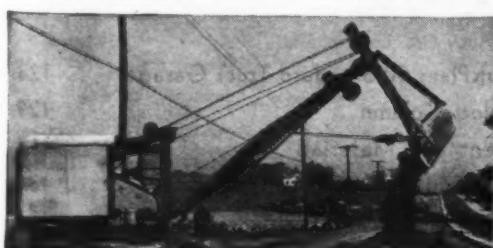
ON THE HIGHWAY

It's Bethlehem All the Way



GUARDS AND POSTS—Standard Bethlehem $\frac{3}{4}$ -in., 3-strand highway guard is made of tough, durable, double-galvanized Bethlehem steel cable. Bethlehem's beam-type guard rail, called the Safety Beam, (shown above) is made in standard lengths of 12 ft., 6 in.—or can be supplied in lengths up to 50 ft.

Properly-driven, Bethlehem Steel Highway Guard Posts have a resistance to impact or side-thrust equal or superior to that of wood posts. The Bethlehem Highway Guard Bracket, made of high-tension spring steel, can be economically applied to guard posts of either steel or wood, even if already standing.



WIRE ROPE—Bethlehem Wire Rope is made in a full line of sizes, and fills needs of highway builders for crane, shovel, dragline, haulage and other kinds of rope. Bethlehem's top-quality rope is its "Form-Set" (preformed) in the tough, strong Purple Strand grade.

REINFORCING STEEL—Bethlehem Reinforcing Bars, plain and deformed, are made in all standard sizes and grades, of new-billet steel. Most Bethlehem warehouses can bend bars to shape and cut them to specified lengths.

Bethlehem Welded Wire Fabric conforms with A.S.T.M. specification A-185-37, and is readily installed and gives reliable service. Made to meet all standard specifications.

Where highway steel products are concerned, Bethlehem will go along with you, all the way down the line. For Bethlehem makes every one of the steel items needed to build a modern concrete highway, and any kind of highway bridge.

Let Bethlehem help you avoid confusion, delay and extra paperwork in obtaining road steel for your highway jobs. When you put the supplying of all the steel for a highway project up to Bethlehem, the order is handled as a unit. Shipments from Bethlehem's strategically-located warehouses are arranged to suit your work schedules. You receive the steel when and as you need it.

The nearest Bethlehem district office—or Bethlehem's general offices at Bethlehem, Pa.—will gladly explain how Bethlehem's co-ordinated highway-steel service can save time and money for you.

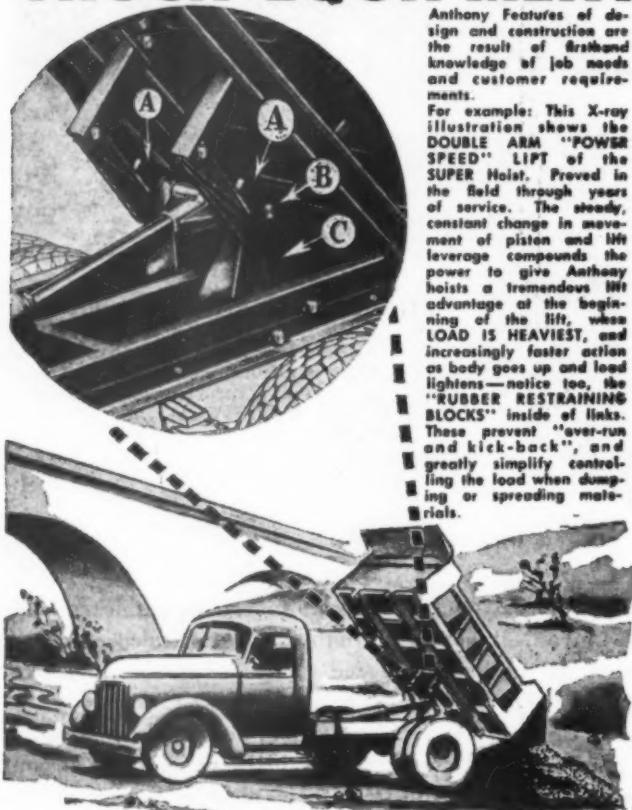
BETHLEHEM PRODUCTS FOR HIGHWAYS

Road Joints • Centes Strip • Dowels • Dowel Bar Supports • Reinforcing Bars • Bar Mats • Bar Ties • Reinforcing for Concrete Pipe • Bridge Floor Reinforcing • Concrete Slab Spacers • Welded Wire Fabric • Guard Rails • Guard Posts and Brackets • Wire Rope and Strand • Right-of-Way Fence and Posts • Anchor Rods • Pipe • Hollow Drill Steel • Digging Bars • Structural Steel • Mold Boards • Corrugated Sheets • Turnbuckles • Tie Rods, Spikes, Bolts and Nuts • Timber Bridge Hardware • Sheet and H-Bearing Piling



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Motor Trucks • 6 Wheelers • Semi-Trailers

ANTHONY LIFT GATE HYDRAULIC

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OLD WAY **NEW WAY**

ANTHONY COMPANY
STREATOR ARMY E NAVY
ILLINOIS

ROADS AND STREETS

Vol. 88, No. 9

September, 1945

CCA

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD ROADS MAGAZINE AND ENGINEERING & CONTRACTING

HALBERT P. GILLETTE, President; **EDWARD S. GILLETTE**, Publisher; **HAROLD J. MCKEEVER**, Editor; **CHARLES T. MURRAY**, Managing Editor; **JOHN C. BLACK**, Field Editor; **LT. COL. V. J. BROWN**, Publishing Director (Absent on Military Duty); **H. J. CONWAY**, Advertising Editor; **L. R. VICKERS**, Promotional Director.

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A steady rock diet like this means plenty of power—and Lorains are long on power which is applied through: (1) The Center Drive design

which permits ganging-up full engine power on any one operation; (2) the Hydraulic Clutch that cushions impacts and shocks; absorbs stresses and strains, prevents engine stall and protects cable life.

Keep the 2 yd. Lorain 82 (with hydraulic clutch) in mind for those jobs where big production means bigger profits. For complete details get in touch with your Lorain distributor, now!

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DEALERS IN MANY PRINCIPAL CITIES



To the AMERICAN CONTRACTOR

-A NEW DAY IS IN THE MAKING!

The immediate past has been a rush of business—contracts have been easy—machinery has been hard to get.

But a new day is in the making—a "tomorrow" with a new situation. Contracts won't come in bunches, machinery will be easy to get and the machinery will play a more important part in the success and profits of your business than ever before.

It is the quality and the advantages available in the machinery you buy that are going to establish profits on narrow bidding margins. It is not at all too early for you to make your plans.

Note the makes of Shovels, Cranes and Draglines in the hands of leading contractors. See

NORTHWEST ENGINEERING COMPANY

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them perform. Find out how they have stood up to the punishment of defense "highball" jobs and military service. Remember that such things as boom design, crowd design, steering, ease of upkeep, ease of control and other features can make or break the looks of a profit and loss sheet. Northwest believes that better machinery earns money, and this is proved by the number of successful contractors that have used Northwest for years.

Ask how the Northwests are doing and you'll plan for your peacetime profits on the amazing story of remarkable Northwest performance.

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YOU HAVE A
REAL ROCK SHOVEL
YOU'LL NEVER HAVE
TO WORRY ABOUT
OUTPUT IN
DIRT

NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

BACON COUNTY'S SMALL, HANDY
TOURNAPULL travels 10 miles

Check List of
MAINTENANCE JOBS
YOU can handle with
SMALL TOURNAPULLS

1. **Clearing** — brush, roots, light stumps, small trees, wind falls.
2. **Grading** — cut-and-fill or hauls from borrow pits; grades ditches; rolls in pipe and backfills for culverts; straightens curves; widens shoulders; increases curve elevations; removes banks to extend visibility; reduces grades.
3. **Graveling** — strips roadside pits; loads, hauls and spreads in place; can distribute any granular type surfacing from stockpiles; big tires compact surfacing.
4. **Land reclamation** — improves drainage; fills mudholes; can strip and redistribute top soil; digs stock ponds.
5. **Airport maintenance** — grading, drainage and surfacing; works over paved, gravel or sod runways without damage.



Traveling 10 miles over paved highway and dirt road, Bacon County's D Tournapull reached washed out in 40 minutes. Big rubber tires, 16.1 m. p. h. speed gave quick move onto job under its own power.



Spreading last load, fill was completed in 35 minutes' working time. This would normally have taken 6 men and a truck a half day.

Culvert Work — Same D Tournapull with Tiltdozer and Carryall backfilled around pipe, covered culvert, finished road surface, in a day's time on another Bacon County job.



Y ONE - M A N - O P E R A T E D

S . . . and repairs washout in

1 HOUR AND
15 MINUTES



▲ Dozer doubled effectiveness of Tournapull . . .
handled final grading of the fill.

Here are two typical county road jobs that show how you can use highspeed D Tournapull rigs to cut your maintenance costs and delays. Bacon County, Georgia, maintains about 1,000 miles of dirt roads running from sand to red clay. About 500 miles are sand and though improved year by year, are subject to bad washouts in wet weather.

Job 1—4 inches of rain between April 22 and 25 washed out a low sandroad section, had traffic blocked 10 miles south of Alma. Bacon County's D Tournapull left the Alma courthouse at 10:30 a.m., traveled 8 miles on U. S. No. 1 and 2 miles over county road, took its first load at 11:10 a.m. Sand was borrowed from the hilltops in the road, one 500 feet west and another borrow 800 feet east of the washout. In 20 minutes the first car went through . . . in 35 minutes the fill was completed and was being "floated" with the Tiltdozer blade to a smooth surface.

Saves Time Over Other Methods

County Road Superintendent R. L. Jordan stated it would have taken 4 hours just to move his crawling tractor and scraper in over back roads for this job . . . or a half day with six men and a dump truck to do it by hand loading. The one-man D Tournapull, with its big rubber tires and 16.1 m.p.h. traveling speed did the whole job in only an hour and a quarter, including move-in time.

Job 2—A clay fill, 125 feet long, carried a road over a bad mud hole that gave trouble after a rain. Bacon County's D Tournapull helped install three 24" concrete culvert pipes about 15' apart to provide drainage. The Tournapull rig backfilled with its Tiltdozer, hauled in dirt with Carryall to build three feet of fill over the culverts. The job was completed in one day, would have taken three days by previously-used hand methods, according to Superintendent Jordan. Tournapull compaction was so effective that the new fill stood up without damage under the 4-inch heavy rain mentioned above.

Has Many Uses

These two jobs merely indicate in part the versatility of the highspeed D Tournapull (see list of uses on opposite page) and its ability to save time and money on county highway maintenance. One unit with one operator can handle small jobs; two working together push load each other and increase output by fast loading of capacity yardage (2.3 heaped yards). Auxiliary Tiltdozer blade, Rooter tooth and interchangeable Crane and flat-bed Tournatruck used with the same D prime-mover increase its range of maintenance service.

Like Bacon County you can show savings in time and money by using D Tournapulls on your road maintenance. Your LeTourneau distributor can show you how. Call him TODAY!

XC88

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A NEW
LUBRICATION
PRINCIPLE



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- 3 Eliminates alibis, costly "lost time" waits and delays.
- 4 Eliminates, once and for all, the "dry bearing" excuse for breakdowns.
- 5 Means money in pocket for you.

"IT PADDLES AND PACKS AS IT PUMPS"

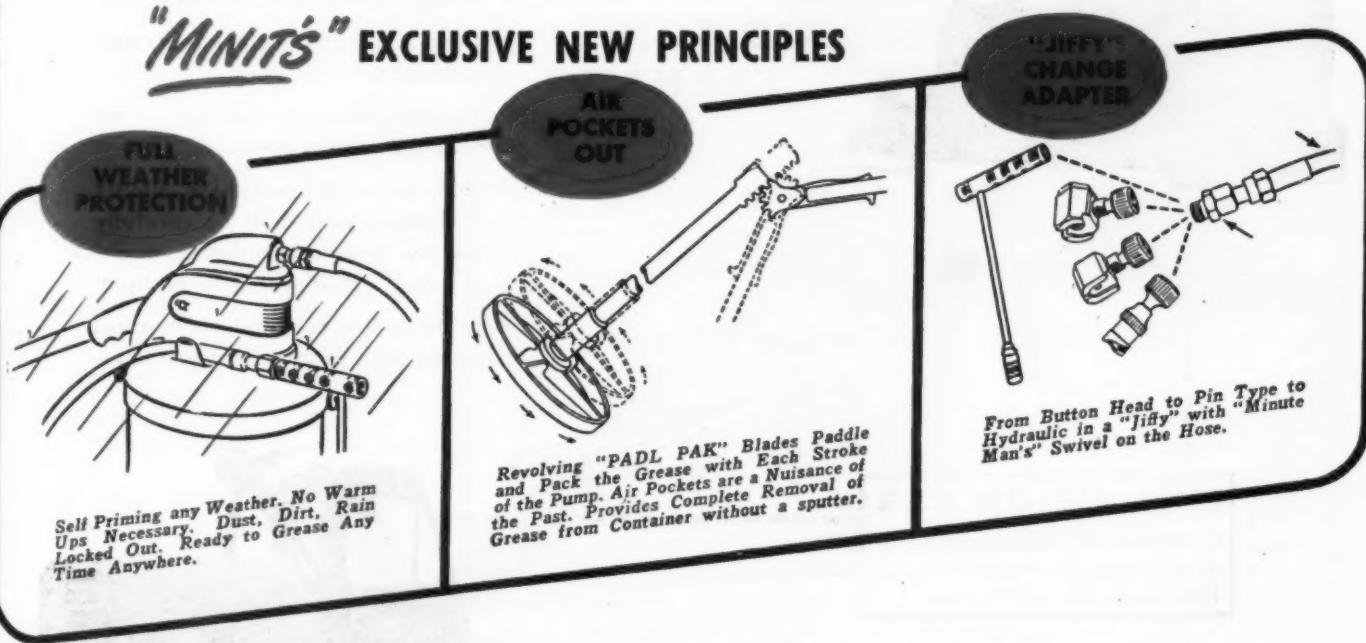
MAINTENANCE

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"Minit" Maintenance with the "Minit" Lubricator is the sensational, proven answer to the lubrication problem of Federal, State, County and Municipal highway maintenance departments, highway contractors—wherever the investment in heavy machinery needs the protection of proper, timely lubrication.

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inch of every stroke: 30 lb. capacity takes full 25 lb. can of lubricant—services hundreds of fittings at one fill: "No Stoop" height makes effortless pumping: Rugged and durable to take terrific punishment.

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- Automatic traction brakes . . . no manual control required.
- One-piece cast gear case, simple in design and built as carefully as the finest automotive transmission . . . dust proof and oil tight.

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SHOVEL**

three times

and out!

why put up with it?



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EVERY BUDGET



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The P&H Single Pass STABILIZER, capable of handling all types of commercial admixtures, opens a new era in low cost building of base courses, light traffic roads, streets, airport runways, etc. If you contemplate work of this nature, write us now for complete information.

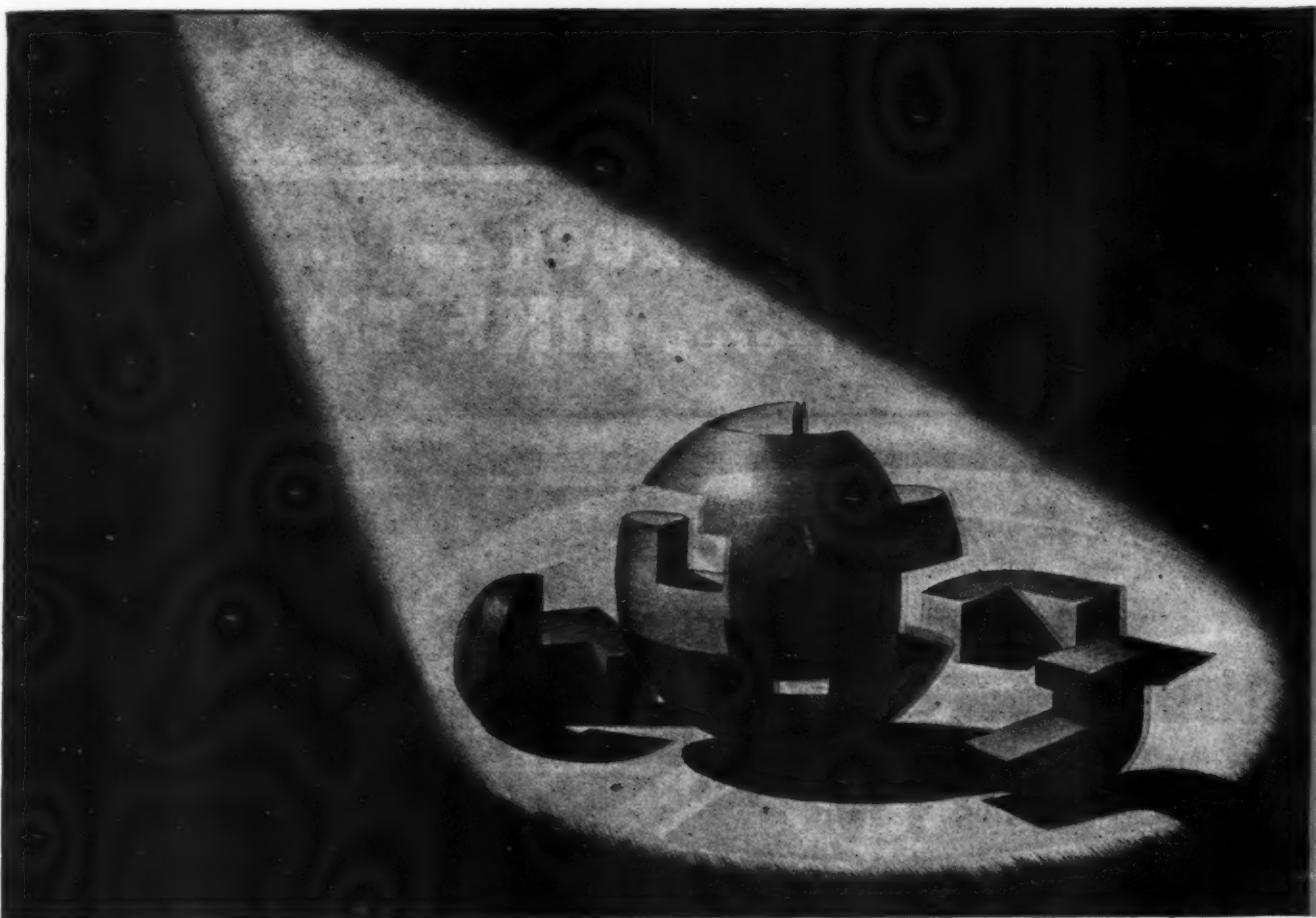
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The right wire rope is the *Solution to every rope problem!*

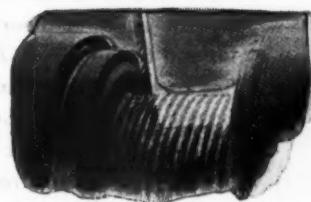
Selection of the *right* wire rope determines true rope economy. Every wire rope design is planned to resist a certain type of destruction.

For instance, few but heavy wires in the strands make a rope that long withstands abrasion but is not built to take bending. The rope made of many small wires resists bending but can't take too much abrasion.

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Thousands of wire rope users—old hands and new—have found our specially prepared manual, "Know Your Ropes," valuable in making their work easier and prolonging rope life. It contains 78 "right and wrong" pictures, 40 wire rope life savers, 20 diagrams, tables and charts. Send for your FREE COPY today.



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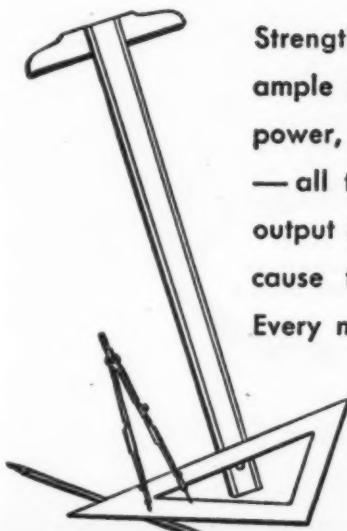
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IE45

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WISCONSIN

Follow the Trend to MOBILE shovels

mounted on big rubber, self-propelled chassis with one-man control, and Full Circle operation . . .



ENTIRELY ONE-MAN
OPERATED FOR DIGGING OR
TRAVELING—NO EXTRA
DRIVER

DIGS ON ALL FOUR
SIDES LIKE A CONVENTIONAL
FULL CIRCLE CRAWLER SHOVEL

SHORT COUPLED,
BIG RUBBER SELF-PROPELLED,
4-WHEEL DRIVE CHASSIS ALWAYS
READY TO TRAVEL ON
HIGHWAYS

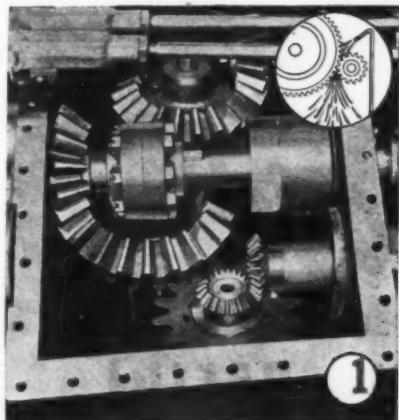
TOMORROW'S SHOVEL IS HERE TODAY!

BYERS HALF YARD TRAVELER

BYERS HALF YARD TRAVELER

Sets the Pace!

THE *Trend* IS TO OPERATING ADVANTAGES LIKE THESE!



1. Less Wear, Lower Maintenance Cost

Gears enclosed in oil-tight housings and lubricated by force-feed circulation. Gears submerged in oil.

2. One Man Control—Flexibility

All operations of traveling or operating are performed by *one man* located in operator's clear, wide visioned control cab.

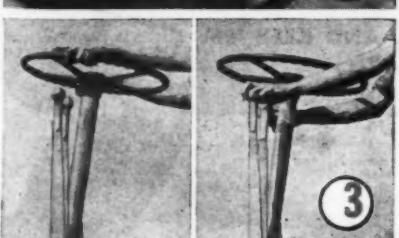
3. Convenient, Accessible Controls

All control levers and foot pedals conveniently grouped so one man can perform all operations easily without leaving his seat. Clutches controlled by finger-touch levers with air pressure . . . not by push, pull and grunt.



4. Improved Air Clutches

Here is cross section view of the "Traveler's" Airflex clutch used for hoist, swing, crowd, boom hoist and travel transmission. It is a masterpiece of simplicity, is engaged by inflating with air, is released by deflating.



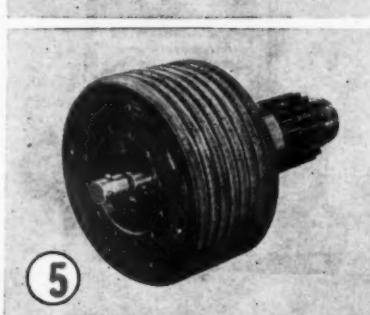
5. Air Clutch Runs Cool

Airflex swing clutch shown here runs so cool, even in warmest weather, that operator can hold his bare hand on finned outer surface of clutch. This is proof of clutching efficiency, freedom from excessive wear.

Full 360° clutch contact with friction surface provides remarkably smooth starting, no jerks, no chattering. Airflex is trouble free because it eliminates adjustment and continual maintenance. There are no clutch adjustments to make or that can be made.

6. Airflex Eliminates Clutch Troubles

Efficiency of this clutch has been proved over many years in varied applications. It requires no maintenance because it has no toggles, no levers, no bell cranks, no connecting pins, no shifter collars, no springs to wear or get out of adjustment.



WRITE TODAY FOR THIS NEW ILLUSTRATED BOOKLET

THE BYERS MACHINE COMPANY

RAVENNA, OHIO

Distributors Throughout the World





Load Packer. Compresses garbage and rubbish. Greater loads . . . fewer trucks and men required.



Three section Hydraulic Repair Tower equipped with extension platform to facilitate work over parked cars.



Street Flushers and Sprinklers . . . tanks for all liquids.



Winches and Cranes for handling pipe etc.



Tree Moving Crane picks up, transports and resets trees.



Cam and Roller, also Direct Lift, Hydraulic Hoists and Bodies.

Always Good

NOW BETTER THAN EVER

GAR WOOD SPECIAL MUNICIPAL EQUIPMENT

For nearly three decades Gar Wood engineering and inventive genius plus Gar Wood quality in manufacture gave public works everywhere the world's finest, most efficient municipal equipment.

Then came the period when Gar Wood equipment was made for exclusive military use. Notable mechanical improvements, and even greater ruggedness, were built into these units giving them a new degree of efficiency.

Now, with civilian production about to be resumed, Gar Wood will build still better municipal equipment . . . with greater values, longer life and maximum economy.

BUY MORE BONDS . . . AND KEEP 'EM

GAR WOOD INDUSTRIES, INC., Detroit 11, Mich.
BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES
WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

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"Boom Guard" Shock Absorber

UNTWISTS ROCK HANDLING STRESSES



YOU CAN'T JAR THE 605 BOOM!

Because the Koehring "Boom-Guard" Shock Absorber takes the jar out of rock shock loading. Heavy coil springs ride out twisting strains of "sweeping up," cushion bending strains when the dipper hits a tough spot in the cut, absorb all the stresses that injure unprotected booms or dipper sticks.

WHY A SHOCK ABSORBER?

Why a shock absorber on a boom that's already plenty strong? Because there may be times, particularly in rock, when even the toughest boom takes it on the chin. That's why it's smart to buy the Koehring 605 with the boom that's shock absorber protected.

BOOM REMAINS RIGID!

Because the Koehring 605 "Boom-Guard" Shock Absorber is correctly spring-loaded, you sacrifice not a bit of the rigidity you want for perfect control. No spring, no bounce, no sway, but full protection when you need it.

KOEHRING COMPANY • MILWAUKEE 10, WIS.



**ASK FOR YOUR 605
CATALOG TODAY**

605



HEAVY-DUTY CONSTRUCTION EQUIPMENT



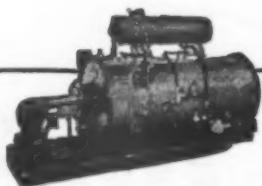
A perfected, highly efficient portable steam generator — on wheels — you can tow this unit with car or truck anywhere you need steam — tank-car siding, construction site, material yard or other location.

In tank-car heating with the Cleaver-Brooks heater you have hot dry steam flowing to the car coils from a cold start in 20 minutes or less. And you can keep going all day with the least work and bother because a Cleaver-Brooks tank-car heater requires less fuel and water. The famous and exclusive four-pass flue travel construction means low fuel consumption; the turbine type condensate return system cuts water loss—every drop of condensate goes back to heater under pressure.

Built for full capacity — full-time work — Cleaver-Brooks tank-car heaters will give you the most in production hours on the job. Wherever in service, Cleaver-Brooks are usually given the tough jobs because of their known reliability.

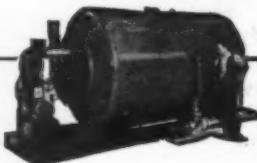
Write today—get bulletins and complete information from Cleaver-Brooks—the pioneers and originators of tank-car heaters and bituminous boosters.

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Automatic Steam Plants

Completely self contained; highly efficient; requires only simple piping connections to place in operation. Fully automatic fuel-oil burner; condensate recovery and feed water pumping system; no stack needed; sizes from 20 to 500 h.p.; pressures 16 to 300 lbs.



Hot Water Boosters

Oil-fired; fully automatic or manual operation; no licensed engineer needed; two capacity sizes: 3000 gals. storage tank for 1600 gals. of water heated 150° F. per hour; 1500 gals. storage tank for 800 gals. of water heated 150° F. per hour.



Portable Pumping Boosters

Heats bituminous material by direct firing in one operation, loading directly to distributor, relay truck or returning to tank car. Two sizes, truck mounting or 4-wheel trailer.



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Available in 2 and 3 tank-car sizes. Oil-fired with exclusive four-pass flue travel; dry-coil steam condensate return under pressure — no water or heat loss. Provides a portable source of steam wherever needed.

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Pioneers and Originators of *TANK CAR HEATERS *BITUMINOUS BOOSTERS *AUTOMATIC STEAM-PLANTS

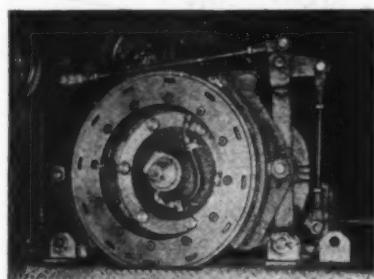
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NEW... FULL-TIME OPERATING EFFICIENCY

with FAWICK CLUTCHES

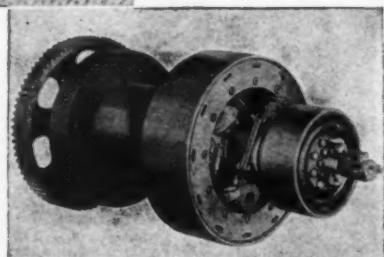


The newest improved type of shovel is Fawick equipped—for more dependable, more economical operation.



Main propel mechanism
of the Shovel above—
Fawick equipped.

Hoist drum assembly
of the Shovel above—
Fawick equipped.



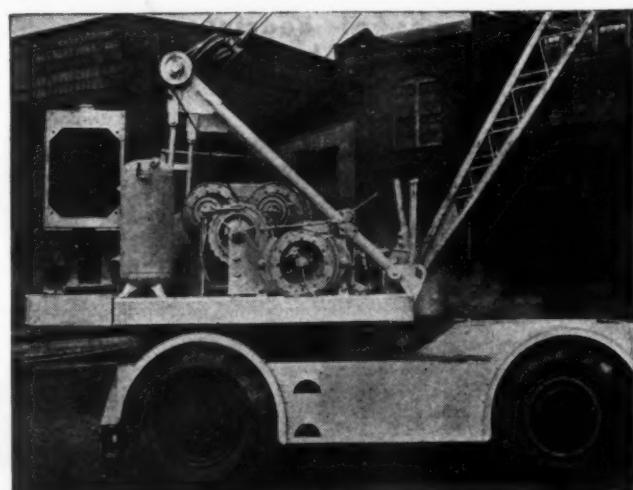
Keep them going—keep them free from down time—that's what Fawick Clutches do for earth-moving and material-handling machines.

This new Clutch controls power and torque through a cushion of rubber and air. It has no springs, arms or levers—requires no adjustments, no lubrication—has low maintenance costs.

Let us help you engineer Fawick Airflex Clutches for your machines. Book on request.



Fawick Clutches are providing new efficiency for shovels, cranes, draglines and hoists.



Seven Fawick Clutches are used on the new Byers 1/2 cu. yd.
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ANTI-FRICTION BEARINGS

A good feature to have in a SHOVEL CRANE or DRAGLINE!

Various Types of Bearings used in LIMA Shovels, Cranes and Draglines



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A type and size for every job
CAPACITIES
SHOVELS, $\frac{3}{4}$ Yd. to 5 Yds.
CRANES,
13 Tons to 100 Tons
DRAGLINES,
Variable

To get the full advantage of anti-friction bearings in a shovel, crane or dragline, the bearings must be applied to every important bearing point, not be applied to high speed shafts. Anti-friction bearings are only one means of reducing friction. They transfer the sliding rubbing friction of a journal bearing into a rolling friction. A good demonstration of this difference may be had by first rubbing the palms of your hands together, noticing how warm they get, then take a round pencil or marble, and rolling it between the palms. Rolling motion starts easier than the sliding motion, therefore, less strains are imposed upon the various parts of the machine. In addition to effecting less bearing friction, anti-friction bearings also save oil, grease and fuel consumed by the engine, and that's not all — anti-friction bearings, when applied to the drums (as they are in a LIMA), hold the drums to the concentric brake action is smooth — no chattering and the clutch and the performance and the longer its life. Remember, the more precise the machine the grabbing.

LIMA LOCOMOTIVE WORKS, INCORPORATED
SHOVEL AND CRANE DIVISION

LIMA, OHIO, U. S. A.

The LIMA DIAMOND — For 75 Years an Emblem of Quality Workmanship





Over ten per cent increase in ground contact is gained with longer track... ground pressure reduced. Addition of a truck roller on each track reduces wear and tear. More tractor weight — approximately 860 pounds — assures better all-round performance.

L · O · N · G · E · R · T · R · A · C · K

A better performer than ever with extended track! More track on the ground means greater traction—more grip, more drawbar pull! Cuts scraper loading time, speeds bulldozing and hauling work... insures better footing on every type of soil. Operators will like its smoother, easier riding. Owners will welcome increased work capacity.

More good news... HD-10's are now more readily available to essential users. In case you have to wait temporarily... it will be well worth while waiting for the improved HD-10!

- Gives You

IMPROVED TRACTION
IMPROVED BALANCE
IMPROVED RIDING
IMPROVED PERFORMANCE!



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TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

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WILL BEST FIT
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MARION HAS IT!

There is a fast, powerful,
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right size and type for
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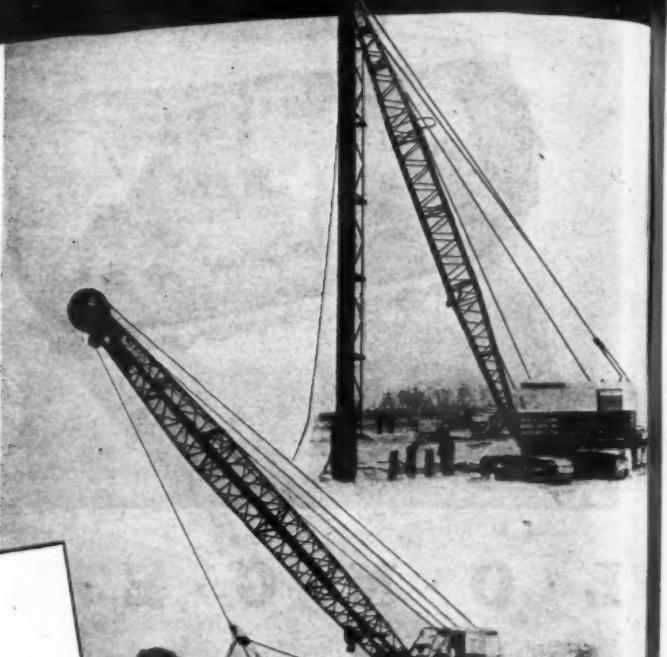
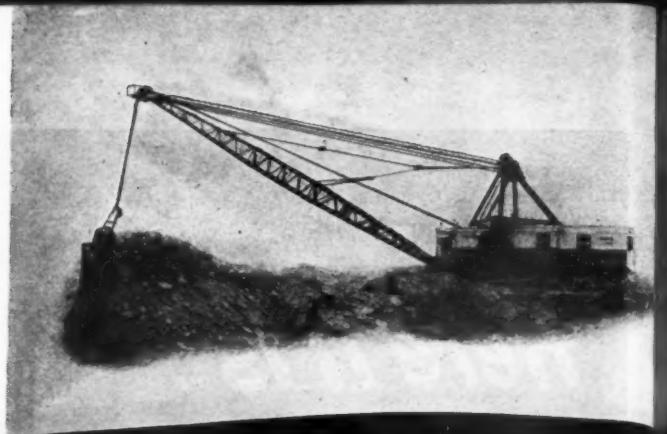
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OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

3/4 Cu. Yd. to 40 Cu. Yds.



WE'VE GOT TO DO MORE THAN TALK ... AND QUICK!

Almost everybody today agrees that an adequate highway program is absolutely essential to a sound post-war economy. In fact, Congress has already voiced its approval by providing three billion dollars of federal funds.

Yet despite all the talk, the job of turning plans into blueprints is still far behind schedule!

Your state, your county has a tremendous responsibility in this important task. For unless adequate construction plans are completed and readied for bids immediately, it will be impossible to provide enough jobs to support the millions of returning service men and workers being released from war plants.

So unless we want "another WPA," it's up to all of us—engineers, public officials, contractors, distributors and manufacturers—to exert every possible effort to speed the completion of local plans, and to support competitive bidding as the one best way to build the kind of roads America needs at lowest possible cost to the Taxpayer. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; San Leandro, California.

LACK OF PLANS JEOPARDIZING HIGHWAY PROGRAM

by Charles M. Upham—Engineer-Director
American Road Builders' Association

"With the need great and with funds available, we might well imagine all state and local highway departments busy as beavers turning out blueprints, writing specifications and doing all those engineering tasks which must be done before contracts can be let and the actual work started. Unhappily this is not the case. Only eight states have sufficient plans ready to make an adequate start; and this lethargy and delay may jeopardize the entire post-war program. It is a matter that concerns every reader of this publication for the condition of the nation's highways affects all of us, no matter where we live or what we do. The answer is to appeal to those charged with preparing plans to get busy immediately."

FOR REAL ECONOMY IN EARTHMOVING
BETTER SEE THE NEW LPC'S



High-Speed
Scrapers



Tractor-Drawn
Scrapers



Hydraulic and
Cable Dozers



Cable Operated
Rippers

LAPLANT  **CHOATE**
EARTHMOVING AND LAND CLEARING EQUIPMENT

Here's what CECO gives you for faster low-cost road building



ACCURATE PRE-BIDDING INFORMATION

Ceco takes the guesswork out of bidding by supplying accurate data, so you can bid to get the job... and make money on it, too.



BLUEPRINTS OF ENGINEERING DETAILS

Ceco engineers do the detail work for you in supplying all engineering data on reinforcing and other materials for the job.



ONE ORDER DOES IT ALL

Ceco streamlines roadbuilding. In one complete order you can specify everything you need. Material is delivered as wanted and on time.



Metal center strip in place; dowel bars supported and ready for support; expansion joint in position.

22 CECO OFFICES AT YOUR SERVICE

There is a nationwide network of Ceco offices to serve you. So when you specify Ceco Highway Products, you know you get fast, dependable delivery from the nearest convenient warehouse... and always there's a Ceco engineer watching every detail... saving you time and money. Yes, here's highway service that's everywhere at once.



Placing the welded wire fabric, illustrating ease of handling.



Cecure compound applicator in operation—final step in highway building.

Investigate Ceco Cecure Curing Method

Ceco's new Cecure applicator offers these advantages:

1. Gives positive application of Cecure curing compound.
2. Works 20 times faster than old style method.
3. Provides uniform curing — reducing danger of cracking.
4. One operation does the job.

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Highway Products Division—5701 W. 26th St., Chicago, Ill.

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Convenient Check List of Ceco Highway Products

Welded Wire Fabric • Metal Center Strip • Dowel Bars • Stake Pins • Dowel Bar Supports • Expansion Joints • Dowel Bar Sockets • Cecure Compound • Sub-Grade Paper

ENGINEERING

MAKES THE BIG DIFFERENCE IN

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CONSTRUCTION PRODUCTS



JAEGER COMPRESSOR

Any Jaeger Compressor will hold air above 90 lbs. pressure for 20 to 25 minutes (5 to 10 times longer than others). THAT'S PROOF YOUR TOOLS ARE GETTING ALL THE AIR!

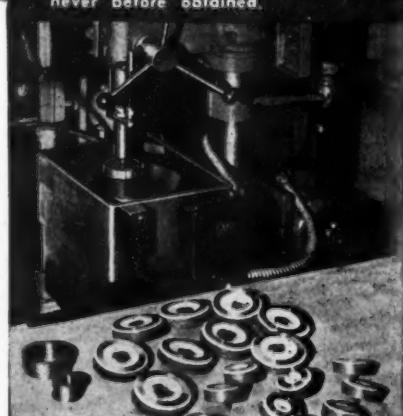


You've got to hold air in order to deliver it. Because they're individually "ultra-lapped" (an exclusive process) Jaeger "Tough Swedish Twin" valves have perfect leak-proof closure—5 to 10 times more effective than the best ordinary valves—one of the reasons why "AIR PLUS" compressors deliver more air, more efficiently, at slower piston speeds and the lowest known cost in fuel. Ask for Catalog JC-5. It describes the most advanced line of air compressors in America—sizes 60 to 500 ft.

THE JAEGER MACHINE CO., Columbus 16, Ohio.

REGIONAL OFFICES: 8 E. 48th St. NEW YORK 17, N. Y. 226 N. LaSalle St. CHICAGO 1, ILL. 235-38 Martin Bldg. BIRMINGHAM 1, ALA.

"Ultra-lapping" process produces precision finished valve surfaces never before obtained.



JAEGER

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Loaders

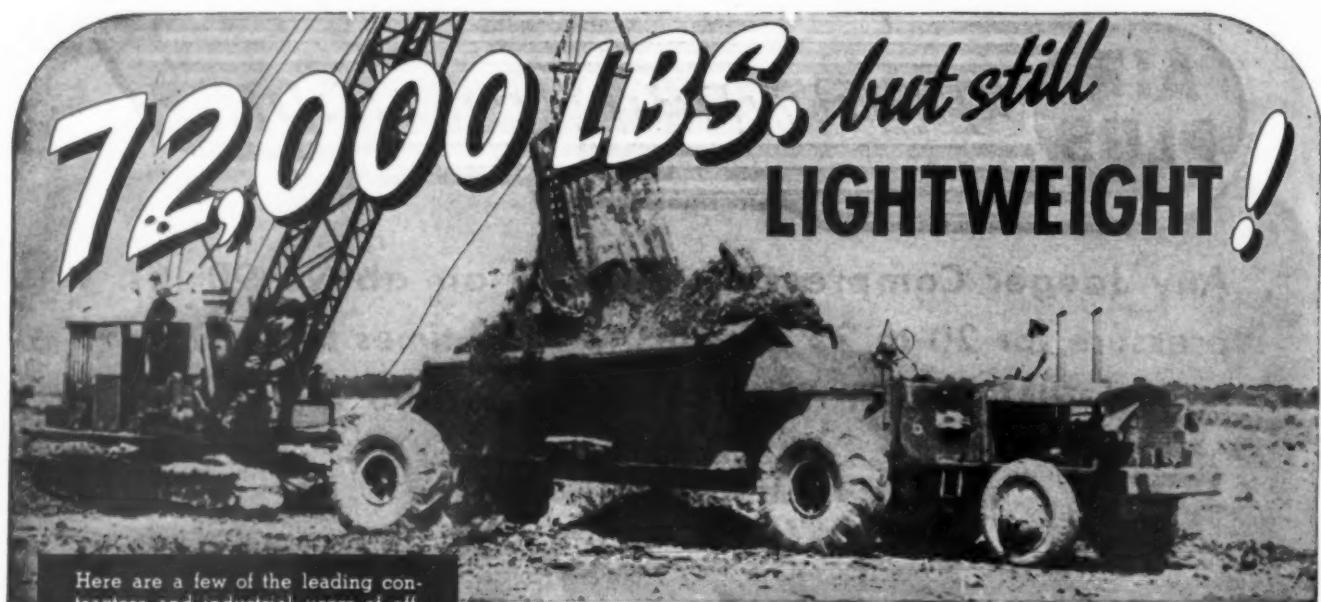


"SPEEDLINE"
Concrete Mixers



"SURE-PRIME"
Contractor's Pumps

JAEGER-LAKWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS.



Here are a few of the leading contractors and industrial users of off-the-highway hauling equipment that are new owners of Euclids:

Algoma Ore Properties, Ltd. Sault Ste. Marie, Ont.
 B & M Construction Co., Pittston, Pa.
 Blair Quarries Blair, S. C.
 John Booth, Inc. Carbondale, Pa.
 A. B. Burton Co. Lynchburg, Va.
 W. L. Cobb Construction Co. Decatur, Ga.
 Donegan Coal Co., Fenwick, W. Va.
 H. C. Frick Coke Co., Pittsburgh, Pa.
 W. E. Graham & Sons, Roanoke, Va.
 Samuel Krauss Co. St. Louis, Mo.
 Limestone Products Uthoff, Ont.
 McFeeley Brick Co. Latrobe, Pa.
 H. E. Millard Annville, Pa.
 Morgan Coal Co. Bryant, Ill.
 Peacock & McQuigge, Ltd. Toronto, Ont.
 Pickands-Mather & Co. Duluth, Minn.
 Richmond Coal Co. Marfrance, W. Va.
 Standard Lime & Stone Co. Baltimore, Md.
 Walsh Construction Co. New York
 Walters & Prater, Morristown, Tenn.

A hauling unit with a gross weight of 36 tons is big equipment in any man's language, but the Bottom-Dump EUCLID is "lightweight" by virtue of its large payload capacity. Bottom-Dump EUCLIDS weigh approximately 32,000 lbs. but have payload capacity of 40,000 lbs. — a ratio of 125 lbs. payload per 100 lbs. of unit weight.

Designed and built expressly for off-the-highway hauling, Rear-Dump and Bottom-Dump EUCLIDS are favored by contractors and industrial owners because of their speed, capacity and rugged simplicity. With modern, efficient loading units and high-speed, large-capacity Euclids, you can move earth, ore, rock and coal at less cost per ton on short and long hauls. Write us or your Euclid distributor for interesting facts and figures on dependable Euclid hauling equipment.

The EUCLID ROAD MACHINERY CO.
CLEVELAND 17, OHIO



EUCLID

SELF-POWERED
 HAULING EQUIPMENT
 For EARTH ROCK COAL ORE





REMEMBER!
It's the Truck
behind
the plow
that counts!

**THERE ARE MODELS TO MEET
 EVERY SNOW CONDITION**

Topped by the 250 H.P. Walter Snow Fighter. This powerful unit clears a 28 ft. width in one run, a two-lane road in one round trip . . . has rugged power to smash through road-blocking drifts plus speed to clear more miles per hour . . . throws snow far to the side to make widening-out easier.

Using general-purpose trucks for snow removal is a gilt-edged invitation to *Trouble!* The trucks you use must be specially constructed for *extra* ruggedness, *extra* power and *extra* traction. If they're not, your most careful planning, your best designed plows, your most experienced drivers will be handicapped.

Walter Snow Fighters are built to fill this one, important need. They are rugged. They are powerful. They have unmatched traction under the worst running conditions. They maintain high speeds to get maximum snow dispersion. They have cleared blizzards in the toughest snow belts on this Continent for the past quarter-century.

Prime reason for this performance is the exclusive Walter Four-Point Positive Drive which proportions power to **FOUR** driving wheels, according to *their traction at any instant*—eliminating slipping, stalling and wheel-spinning. Suspended Double Reduction Drive results in higher ground clearance, less unsprung weight, larger gear capacity, better protection for parts. Write today for full information.

WALTER MOTOR TRUCK COMPANY
 1001-19 Irving Ave., Ridgewood 27, Queens, L. I. N.Y.

WALTER
SNOW FIGHTERS



TO Remove SNOW AND ICE

Treatment METHOD

"Treating" snow and ice with sand, cinders and other abrasives produces only a temporary effect—and does not remove these highway hazards. Such methods can result in a spotty irregular application—and in a continuing storm, the development of a thick ice mat. Abrasives remain behind to clog sewers and catch basins.



YOUR SURE SAFEGUARD against snow-blocked and ice-sheathed roads is Sterling "Auger-Action" Rock Salt! For Rock Salt doesn't simply "treat" snow and ice . . . it removes these wintertime perils.

Highway officials have proved by wide experience that Sterling Rock Salt has enabled them to speed up operations, save labor and equipment—for the volume of salt to be hauled is far less than the corresponding volume of abrasives needed. Danger of damage to vehicles from abrasives is eliminated. Rock Salt is easy to handle, store and haul—it stays dry—does not damage shoes, hands or clothing . . . and no Rock Salt remains to clog drains and sewers.

INTERNATIONAL SALT COMPANY, INC. • Scranton, Pa., New York, N. Y.

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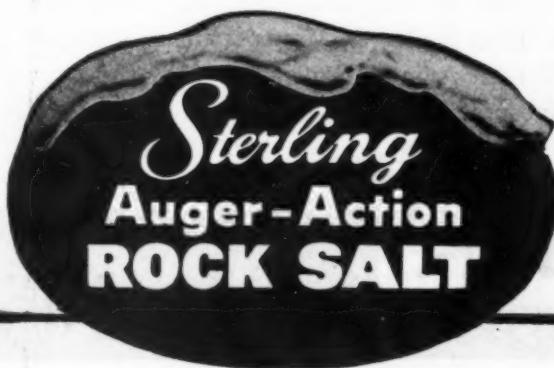
ICE JUST - PASS the SALT

Removal METHOD

Sterling "Auger-Action" Rock Salt gives quick results. Rock Salt removes ice. Turns light snowfalls into slush quickly whipped off to the side by passing traffic. It keeps even the heaviest snowfall mealy and loose for quick clean-up with plows. And finally, after plowing, Rock Salt melts what is left, leaving streets and roads bare.

The surest way to enjoy good public relations is to give good public service.

- ★ Streets are quickly cleared.
- ★ Pavements bare of treacherous ice are safer.
- ★ Open roads guarantee deliveries of food and fuel ... insure normal industrial operation.



**Don't "TREAT"
Ice or Snow
REMOVE IT!**

International Salt Company, Inc.
Dept. RS-9 Scranton, Pa.

Get the full facts in new FREE booklet!

To do an efficient removal job with utmost economy ... just fill in this coupon and mail it today for your free copy of "WHY, WHEN AND HOW TO APPLY STERLING 'AUGER-ACTION' ROCK SALT."

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FLUID PRESSURE COMPACTION



...with a BROS "WOBBLE WHEEL"® ROLLER

Road or air-field foundations must be evenly and thoroughly compacted to support surfaces that have a low-cost maintenance and lasting utility. They need the fluid pressure compaction of the Bros "Wobble Wheel"® Roller which works and kneads the material together, eliminating voids, and compacts them to a uniform density from top to bottom

and from side to side. The rubber tire rollers, low-pressure inflated and with smooth treads, provide a firm and durable foundation—proving once again that "you get the most and only from Bros". Wm. Bros Boiler & Manufacturing Company, 1057 10th Avenue Southeast, Minneapolis 14, Minnesota.

*Copyright 1945, Wm. Bros Boiler & Mfg. Co.

BROS

FABRICATORS OF STEEL • BOILERS • STOKERS • TANKS • ROAD EQUIPMENT

GET IN THOSE LAST LICKS BEFORE WINTER



1. WEATHER-PROOF

Weather-proofing is the cheapest insurance in protecting your original investment in your roads. On newly constructed pavement do not put the weather-proof coat on until the mix has properly cured. In average cases .10 of a gallon to .33 of a gallon of asphalt per square yard is applied to 10 to 30 lbs. of material. This type of surface is also used to reliven old asphalt pavements and to seal them against the ravages of winter. For actual prescribed amounts and types of material for you to use, contact the Asphalt Institute, 801 Second Avenue, New York City, New York.

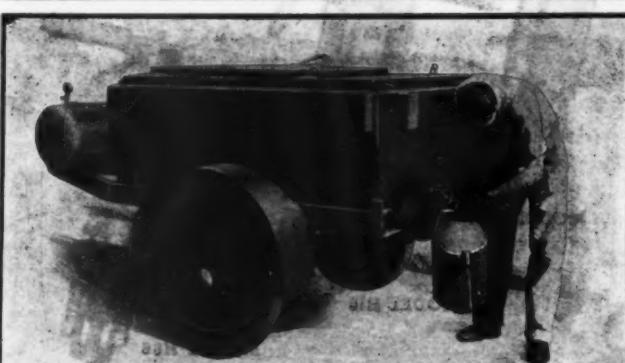
2. PATCH...

The longer a chuck-hole, pot-hole or a raveled edge remains, the larger it becomes and the more danger it is to your base if not repaired before fall rains and winter snows. Clean out the hole at once. Square it up in the direction of traffic so as to provide a shoulder against the movement of the patch. Then fill this hole with new aggregate, the same character as is adjacent to the surrounding area. Then thoroughly consolidate the material in place. Pictured at the right is a Standard Steel Works Model SJ being used to prime a cleared patch.



3. FILL CRACKS

Cracks and crevices in pavements give water an open access into the base of your road which will result in deterioration of the base and final breaking of the surface. Cracks should be watched carefully and filled at once. In filling cracks, a mineral-filled asphalt should be used and poured hot into these cracks. Material should be heated to a temperature not to exceed 375° fahrenheit. Shown at the left is a Model S Tar Kettle and the operator is drawing off material into a crack filling pot. The joint should then be filled flush with the pavement and any excess material be removed.



SALES OFFICES IN PRINCIPAL CITIES

OTHER PRODUCTS

Asphalt Distributors • Tar Kettles • Maintenance Distributors • Burners • Street Flushers • Spray Units • Supply Tanks
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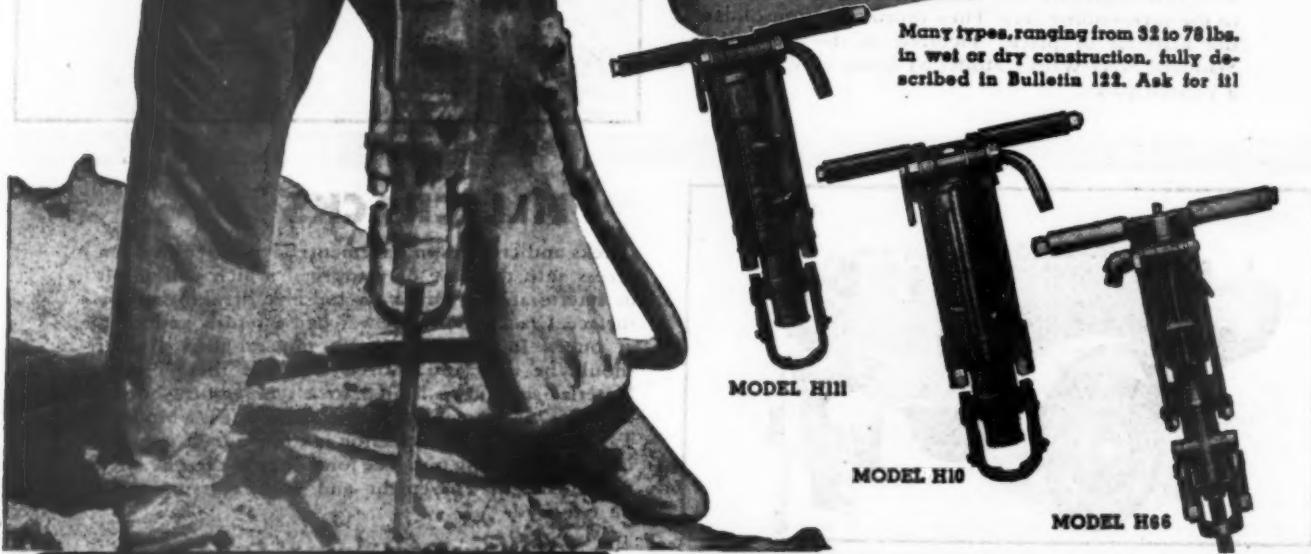
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12

reasons why CLEVELAND SINKERS
are PREFERRED...

1. Drop forged construction insures more strength.
2. End-sealing valve (used on most models) improves with use, prevents greater oil consumption with long wear.
3. Big oil reservoir holds enough for four hour's steady operation.
4. Lubrication of rifle nut and bar prolongs their life 50%.
5. Complete lubrication of all parts of the machine insures longer wear of all moving parts.
6. Chrome plated spacer wears 3 times longer, insures full cushion on front end, avoids piston and side rod breakage.
7. Large areas of face contact hold parts in line, minimize wear on joints.
8. Floating chuck clutch prevents binding of piston.
9. Well designed exhaust port prevents freezing.
10. Throttle detents fully enclosed and well oiled.
11. Four pawl rotation—rugged and reliable.
12. Goose neck swivel oil connection.

Many types, ranging from 32 to 78 lbs.
in wet or dry construction, fully de-
scribed in Bulletin 122. Ask for it!



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THE CLEVELAND PNEUMATIC TOOL COMPANY

CABLE ADDRESS: "ROCKDRILL" • CLEVELAND 5, OHIO

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in DRILLING EQUIPMENT

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"Caterpillar" Diesel D8 Tractors pull scrapers on medium hauls in building the mountain-top Kanawha Airport



NEAR Charleston, West Virginia, heart of the Kanawha chemical and industrial empire, a remarkable airport is being built. There's no level ground in the region — nothing but rough sandstone hills and narrow, steep-sided valleys. But by slicing the tops off four adjacent mountains, and filling the valleys between, they're building a huge, modern airport with runways 6000 feet long!

Today some 60 "Caterpillar" Diesel Tractors—track-type and wheel—are busy moving these mountains. Husky D8's are slashing through earth and rock with their bulldozers and tumbling the hilltops into fills as deep as 230 feet.

On the medium hauls, the same sturdy track-type tractors are pulling 25-yard scrapers to the fill. And on the longer hauls of half a mile or more, where road-speed is important, "Caterpillar" Diesel DW10 Tractors, rolling on rubber, take the earth away in "Caterpillar" W10 Wagons. The whole mountain-moving operation is a graphic example of *zoned equipment*, effectively used on a contract totaling over 5,000,000 yards.

Also on this job, three "Caterpillar" Diesel Motor Graders are construct-

ing haul roads and runways; and nine "Caterpillar" Diesel D13000 Engines are powering shovels and compressors.

The Harrison Construction Co., contractors on the airport, have had a great deal of experience with "Caterpillar" Diesels, moving more than 32,000,000 yards of earth in the past four years. Says L. S. Wescott, Asst. Chief Engineer: "On our jobs, temperatures have ranged from 110° in the shade to 40° below zero. Mud has been knee-deep and dust almost as thick. Completely equipped repair shops have been non-existent, and, in spite of these conditions, field-repaired 'Caterpillar' equipment has stayed on the job, working night and day."

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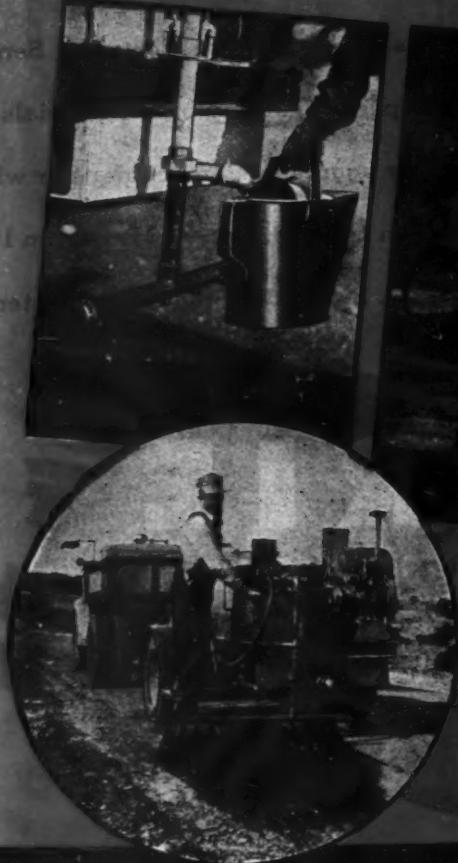
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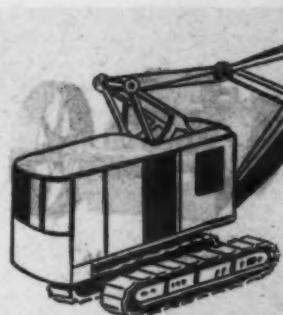
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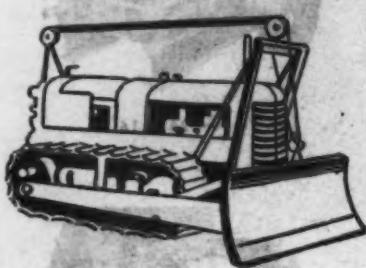
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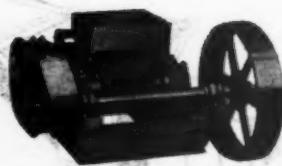
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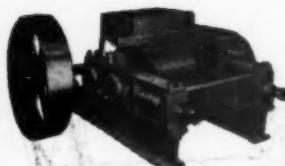
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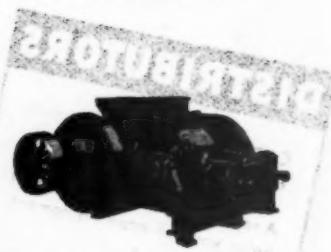
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Headed for a long, long run



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Plain Pavement



Open Crack

Structural Action at Crack in Plain, Non-Reinforced Pavement.

As wheel load approaches crack in plain pavement, loaded slab end carries entire load with no assistance from non-loaded slab.

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As wheel load approaches closed crack in reinforced pavement, aggregate interlock renders the crack-joint shear resistant, and both slab ends, instead of one, carry the load.

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Cracking in concrete pavements cannot be eliminated entirely, but experience has proved that when the pavement slab is reinforced with Welded Steel Fabric between joints, the formation of wide cracks is prevented. The reinforcing holds the aggregate of the fractured slabs in close contact and enables the slab to function as a unit rather than as individual parts.

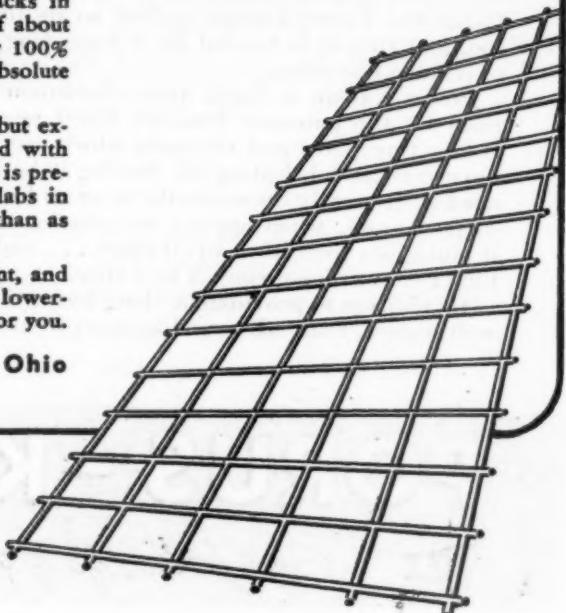
You can be sure that Truscon Welded Steel Fabric Reinforcement, and associated Truscon steel roadbuilding products, will build better, lower-cost roads for the communities you serve, and greater prestige for you.

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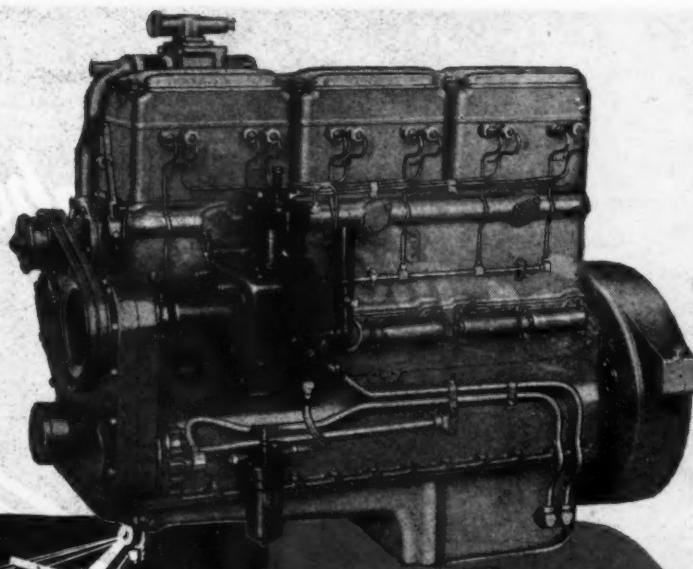


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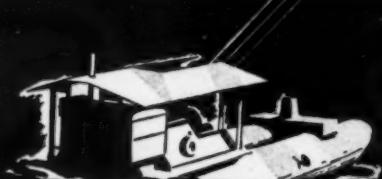
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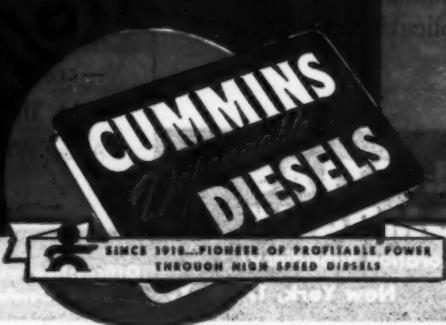
In the vast Mid-Continent Area—the world's greatest oil producing region—CUMMINS Dependable Diesels power more drilling rigs than any other diesel.



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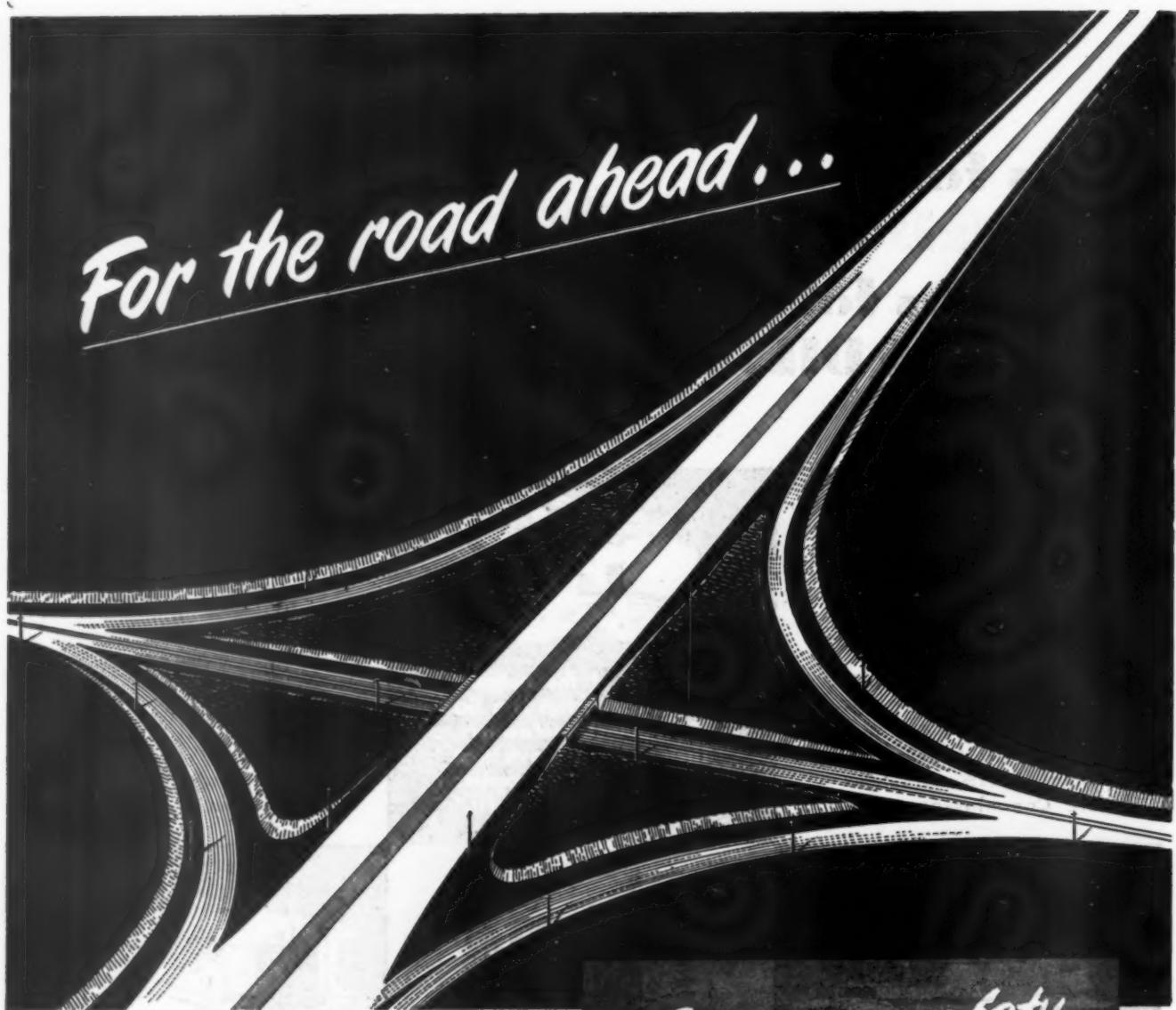
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Made with **ATLAS DURAPLASTIC** . . . the
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REFLECTING CURB . . .

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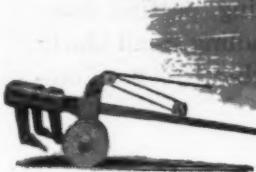
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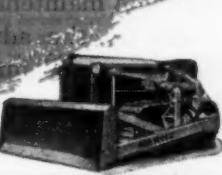
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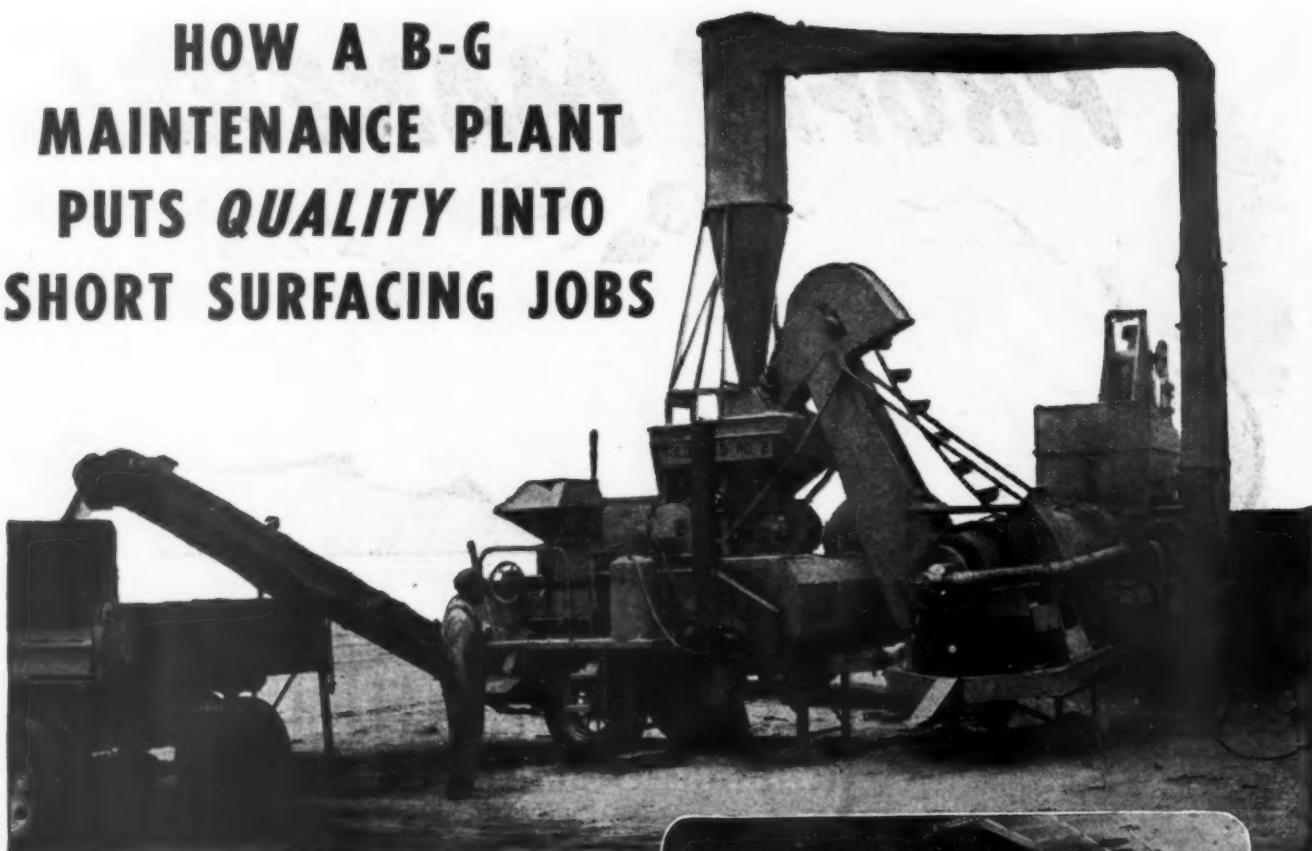
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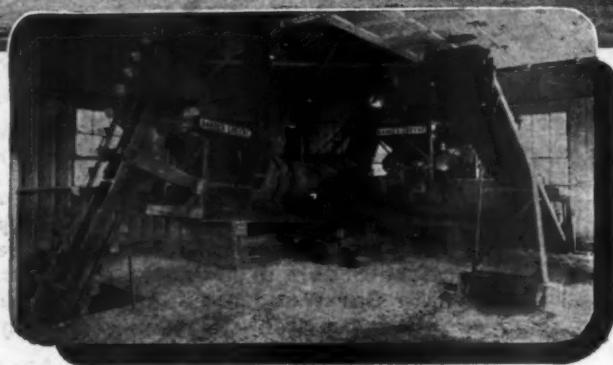
A B-G Portable Maintenance Plant with Dust Collector.

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With the B-G Maintenance Plant you can economically produce the highest quality bituminous mix for short street and highway jobs, for patching, and for surfacing driveways, parking lots and other small areas.

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Where a permanent set-up is desired, equipment is furnished without running gear. Mixer can be used as separate unit when desired. Plant produces all types of bituminous material—hot, cold, sand, sheet, powdered and emulsion mixtures.

... its thoroughly controlled mixing . . . its extreme portability and flexibility, and you'll find where huge savings are effected in time and money over the years in patching, putting down short stretches and handling small black-top paving jobs. Barber-Greene Company, Aurora, Illinois.



Barber-Greene



Constant Flow Equipment





OUT OF THIS WAR —the Red Diamond Engine

International Red Diamond Engine. Heavy-duty power for heavy-duty work. Ample power and capacity—surprising economy. Proved in actual combat warfare, now available for civilian service.



The new Red Diamond Engine powers International Models K-8, KS-8, KR-11, and KS-11.

THE rugged requirements of warfare on every battlefield have inspired the engineering genius of American industry.

Out of this war has come, for example, the new *International Red Diamond Engine*.

Tens of thousands of International Military Trucks and Half-Tracks—powered by this new International Red Diamond Engine—have set new transportation and combat records in wartime service.

Many of these mighty Red Diamond Engines have already gone into International Heavy-Duty Trucks for essential civilian use. The men who operate them will vouch for the stamina and economy of adequate power for any job.

When new trucks roll out in volume on America's highways, look to International for even greater economy, even greater dependability. And remember—for ten years before the war *more heavy-duty Internationals were sold than any other make*. Backed then, as now, by the *world's largest company-owned truck service organization*.

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180 N. Michigan Ave. Chicago 1, Illinois

NEW TRUCKS: The government has authorized the manufacture of a limited quantity of light, medium and heavy-duty International Trucks for essential civilian hauling.

SERVICE: Many operators will have to wait for trucks. Maintenance of existing vehicles is just as important today as before V-E Day. Therefore—be sure your trucks get top care and service at International Truck Dealers and Branches.



INTERNATIONAL TRUCKS

Good Roads

CHAMPION SNOW PLOWS



Reversible Blade Plows
100 Series



High-Speed One-Way Plows
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MOVE MORE SNOW
WITH LESS HORSEPOWER



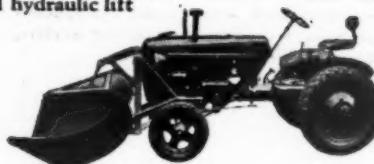
Truck-Mounted Wings—Full
Power—Hydraulic Control



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Safety blade trip
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V-Plow and Front-Mounted Wing
—Full Power—Hydraulic Control
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Heavy-Duty Center Plow
for removing hard packed
ice and snow

THERE IS A SIZE AND
TYPE TO SUIT YOUR
NEEDS EXACTLY

PICK YOUR PLOW
FROM THE WORLD'S
MOST COMPLETE
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THE OLDEST AND
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RIGHT NOW BEFORE
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FOR FOLDER No. 108.
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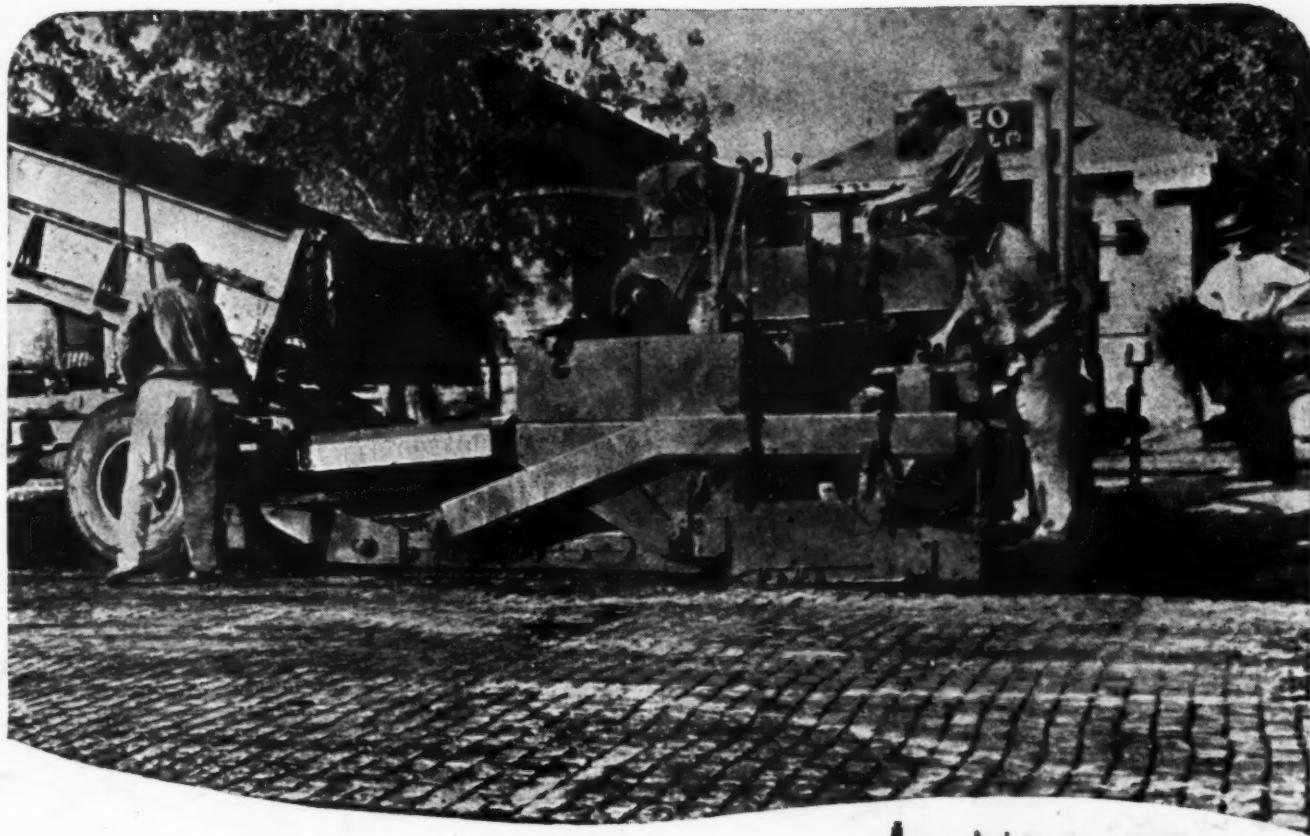


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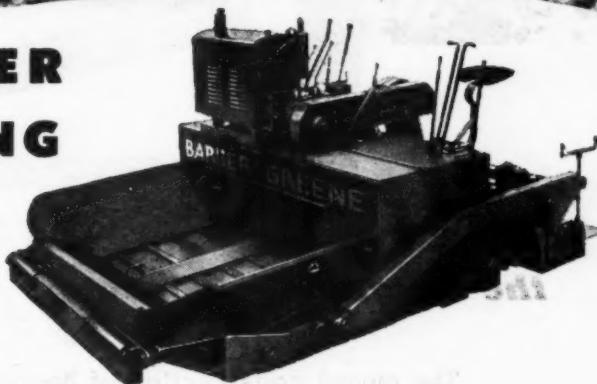


HOW A B-G FINISHER SOLVES RESURFACING PROBLEMS...

• When something must be done to rough, patched-up pavements, with their chuck holes and sinking spots, very often the best solution is complete blacktop resurfacing with a Barber-Greene *Tamping-Leveling* Finisher.

You can utilize the old base and save the cost of new construction . . . eliminate the need for special engineering and preparation —yet restore broken and traffic-worn roads and streets to smooth, safe surfaces that are as good as ever.

And whatever type of asphalt material you choose, your B-G Finisher will lay down a firm, level mat without the use of forms. Rolling can progress right up to the machine as it moves along steadily and speedily. Traffic interruption is practically avoided.

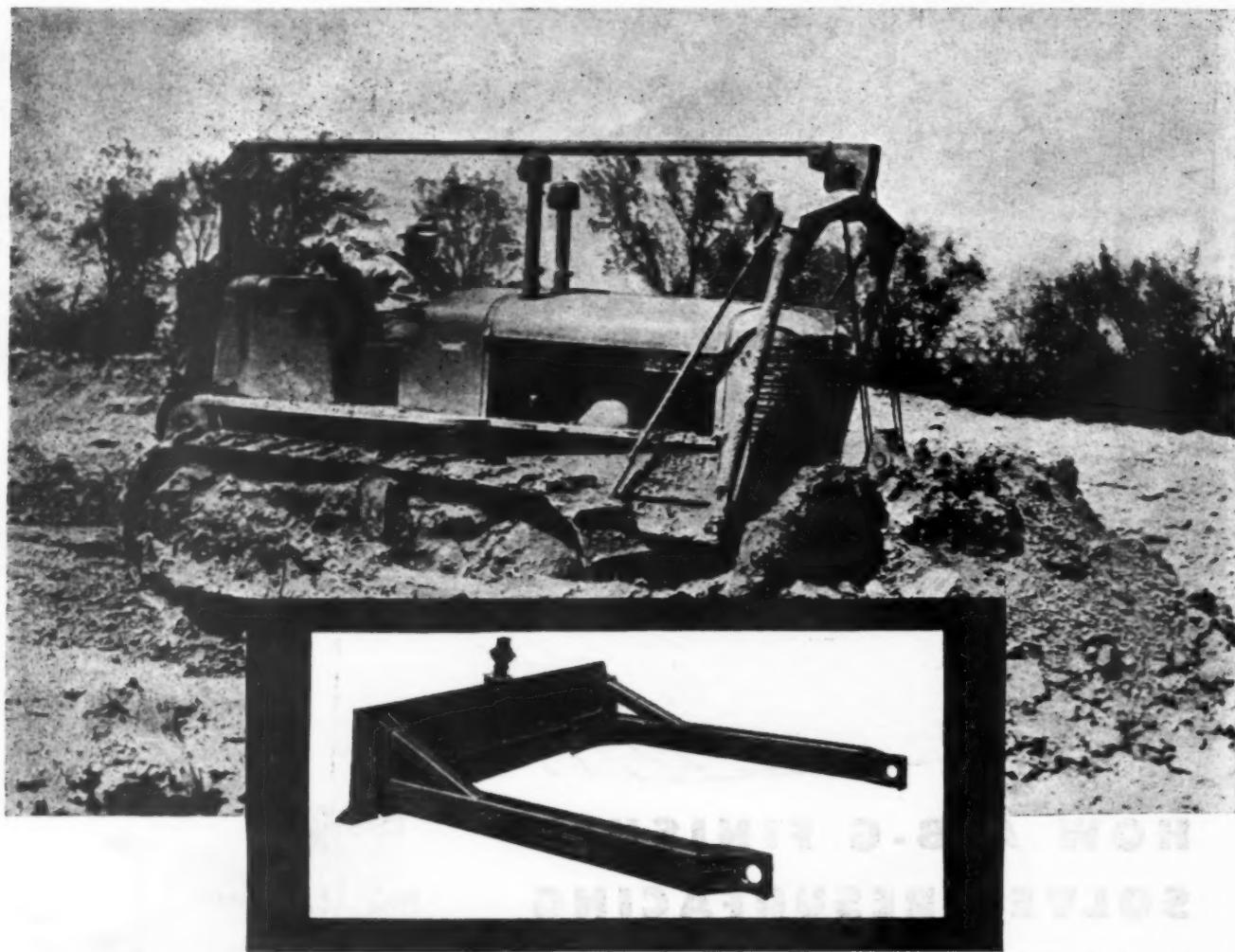


B-G finished surfaces *stay level*. An exclusive B-G mechanism tamps the material as it strikes it off, compacting the mix to uniform density. Two long, pivoted arms connect the crawler and screed units—abrupt changes in the thickness of mat are mechanically impossible.

Before you buy any bituminous finisher, learn about the many superior B-G features that years of engineering research have developed. Send for free catalog describing this versatile machine. Barber-Greene Company, Aurora, Illinois.



Barber  **Greene**
Constant Flow Equipment



the toughest job **PUSHOVERS** *of Buckeye Dozers*

The rugged construction of Buckeye Dozers is the reason why they stand up under the toughest operating conditions. Just look at all the horizontal and vertical reinforcing ribs on the moldboard. The push plate also has heavy steel ribs spaced only a few inches apart. Push arms are of heavy box beam construction.

The moldboard can take the full power of the tractor on one corner without permanent deflection. Rigidity is maintained in every position. Every feature is built to roll bigger yardage loads with never more than minimum lost time for repairs and maintenance. Write today for specifications.

④

 **Built by Buckeye**

Buckeye Traction Ditcher Co., Findlay, Ohio





They're necessitated by the fact that we're currently faced with the problem of fulfilling our "roller obligations" to the armed services and getting production under way on the limited number of Maintainers and Rollers we've received permission to manufacture for civilian use. As a consequence, we haven't found time to get out into the field and photograph our 1945 models at work. Users report, however, that these new Hubers are even better performers than their predecessors. And that's saying something!

THE



MFG. COMPANY • MARION, OHIO, U. S. A.

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Good Drainage means year-round air traffic



ARMCO PERFORATED PIPE

Good drainage stretches your airport calendar—keeps landing facilities open to "pay traffic" the year round. Well-designed storm drains promptly remove surface water after a storm. Properly designed subdrains remove ground water which is the chief enemy of pavement foundations. A pavement is no better than its foundation.

Strength Where It's Vital

You'll find ARMCO Pipe excellent for this vital job when you plan or design a post-war landing field. This widely used metal pipe has proved its ability to resist crushing, cracking or disjoining under the impact and weight of heavy loads. It insures freedom from failure . . . lower airport maintenance . . . safer all-weather operation.

Long Lengths Save Time

Long lengths of ARMCO Pipe, tightly joined with sturdy band couplers, are easily and quickly installed by unskilled workmen. Shifting soils and severe frost action are no hazards.

Ask your local ARMCO man or write us direct regarding specific drainage problems. Armco drainage Products Assn., 15 Curtis St., Middletown, O.

Long lengths of ARMCO Perforated Pipe joined with sturdy band couplers are easy to install and form a sturdy, flexible drainage system for a landing field.



There's NO ZIG - NO ZAG!

Full power at all times and positive two wheel steering control coupled with the floating oscillating pivot of the Wooldridge Terra-Cobra, high-speed, self-propelled Earthmover make it possible to operate on soft, sloping, or inclined surfaces. Both units can freely tilt in opposite planes at the same time—even while the engine unit turns in either direction—without any danger of tipping—or damage resulting from exerted strains. This permits a Wooldridge Terra-Cobra to work safely in spots where others might "fear to tread." True directional steering also allows the Terra-Cobra to spread close to the edge of soft fills. Full details furnished on request.

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POWER
MAINTAINED
ON BOTH WHEELS
AT ALL TIMES

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BLACK TOP
PAVER**

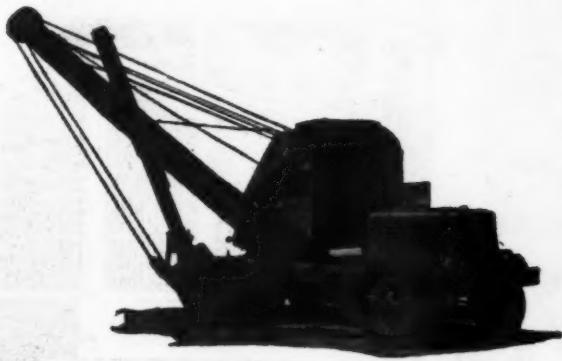
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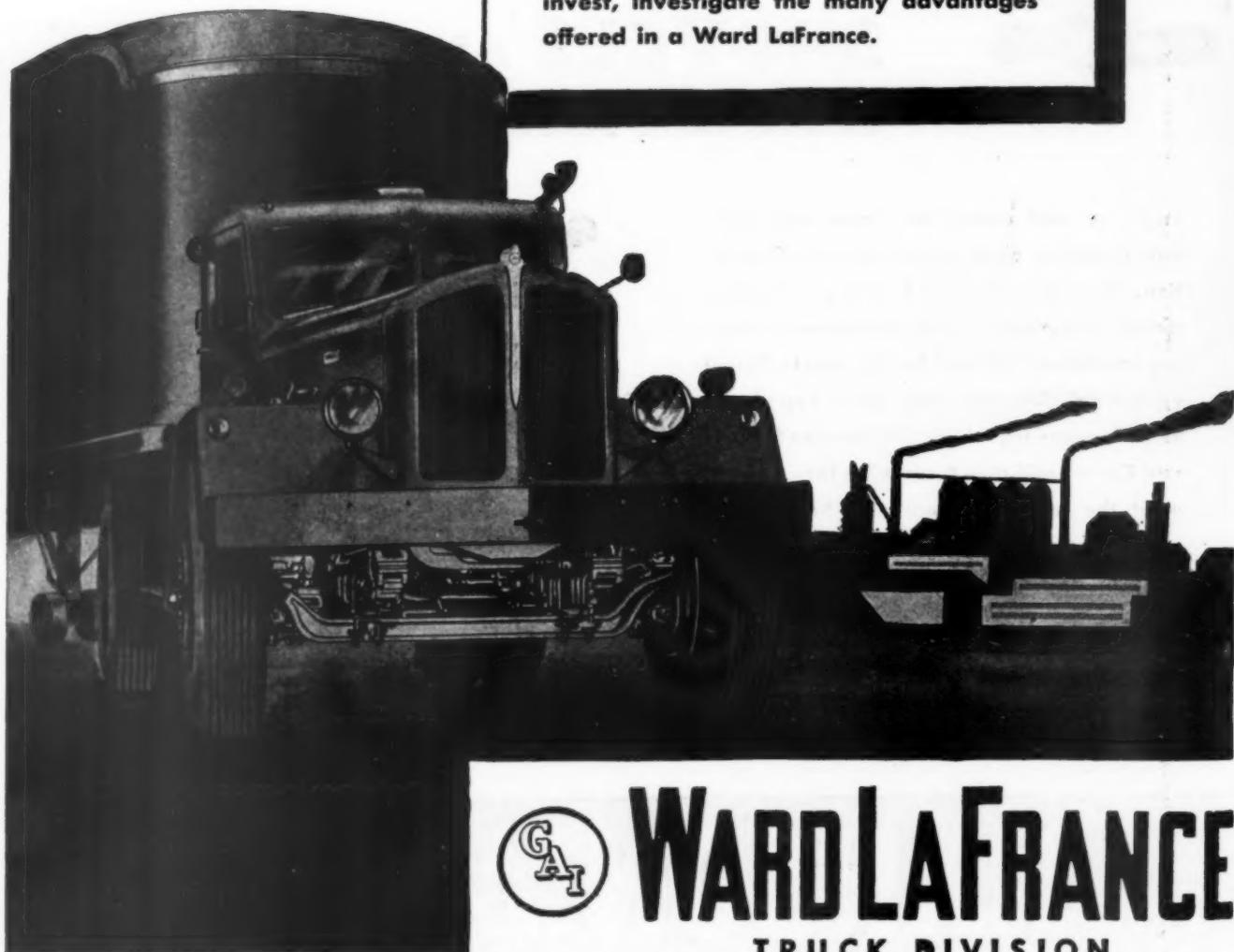
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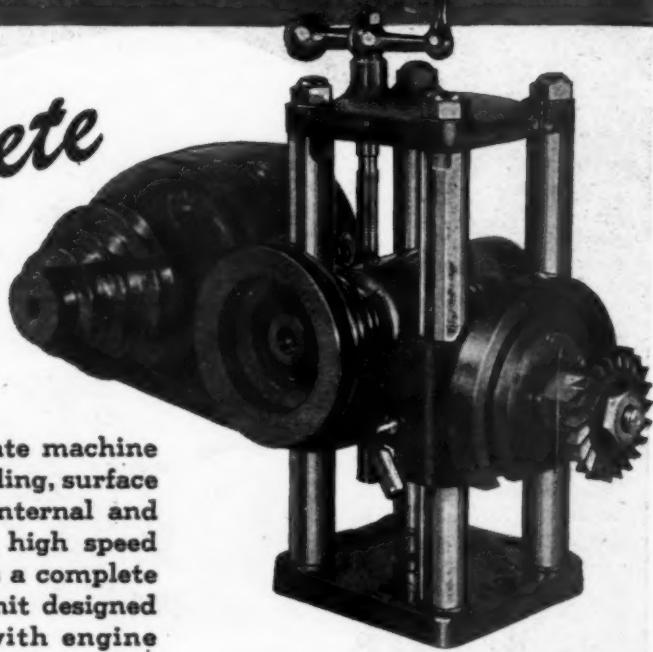


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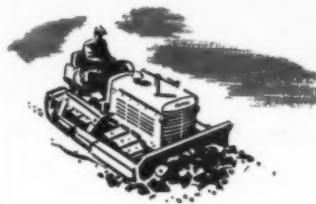
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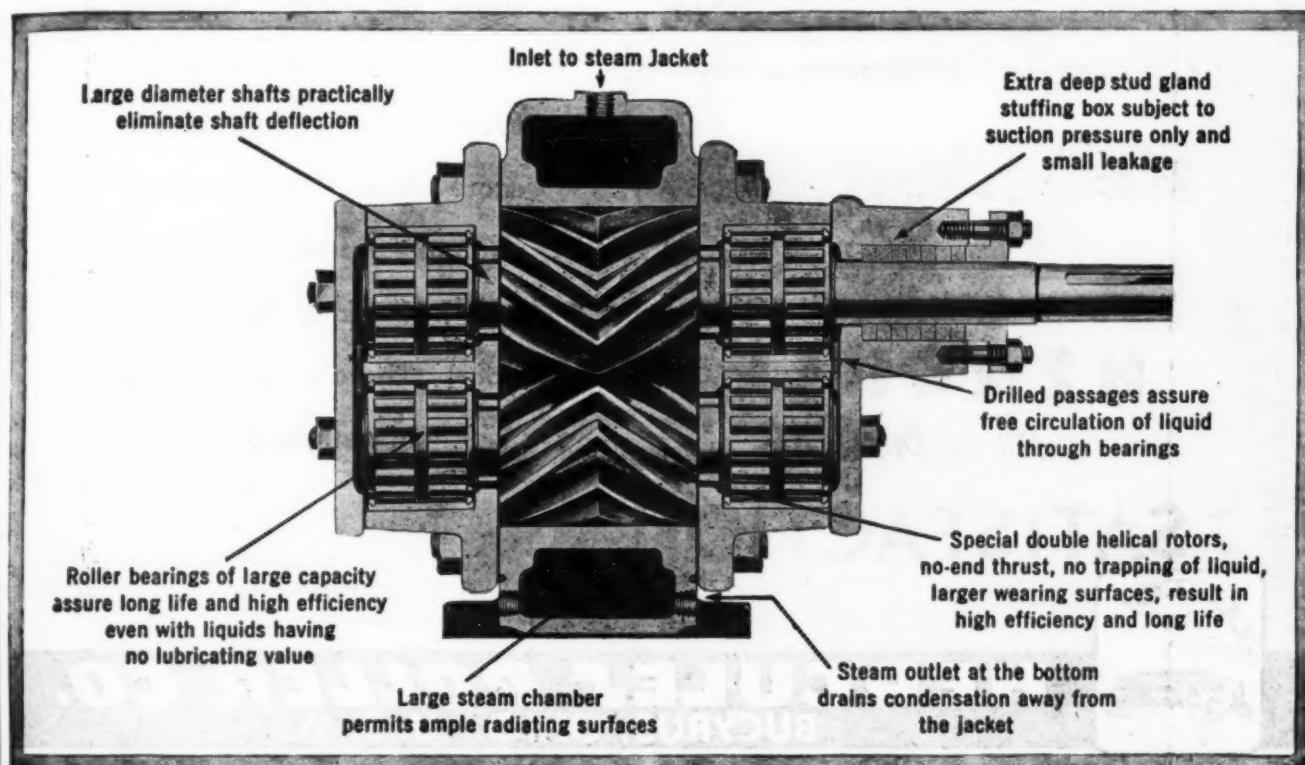
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HOW TO HANDLE ASPHALT WITHOUT GETTING "STUCK"



Specify Worthington GRJ Steam-Jacketed Rotary Pumps

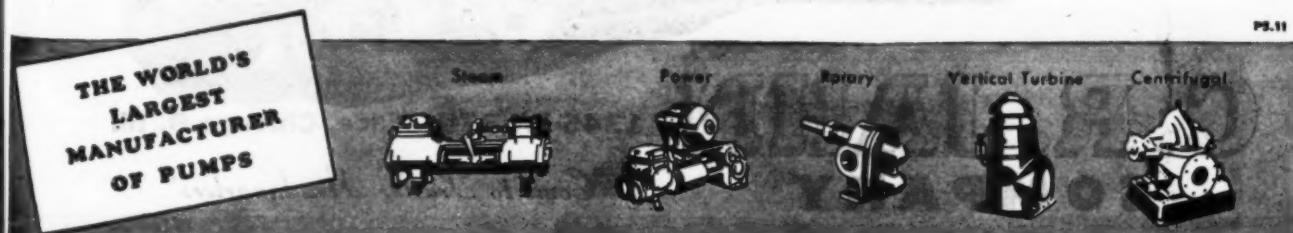
Trouble-free handling is what you want in the pump you depend on for putting asphalt where you want it when you want it.

Fortunately, you can get dependability in a Worthington GRJ Steam-Jacketed Rotary Pump. The cross-sectional picture above shows you why. One thing the picture doesn't show, however, is the short starting time which results from the large radiating surfaces of the Worthington heating jacket. That means less time lost by equipment and men waiting for asphalt to flow.

Your nearby Worthington Representative can give you other valuable facts about Worthington GRJ Rotary Pumps. In the meanwhile, you can prove that *there's more worth in Worthington* by writing for Bulletin W487-B11. *Worthington Pump and Machinery Corporation, Harrison, New Jersey.*



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100% CABLE CONTROL OF BUCKET
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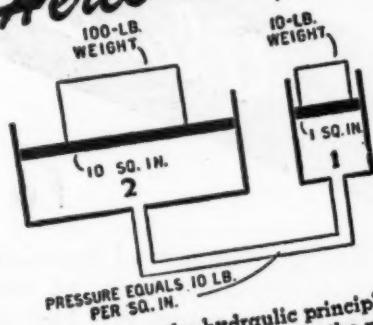
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Hydraulic BULLDOZERS
give you

Power in the "Pinches"!

On some jobs maybe any bulldozer would be good enough, but sooner or later you will run into a job where powerful hydraulic direct down pressure on the blade will be demanded. On stripping, land clearing and road building it happens often. The blade of the Baker hydraulic can be forced into the cut and held there. It does not depend on weight of mold-board or gravity alone. Full weight of tractor front end can be exerted on blade. When you strike boulders, roots or tough shale that's when direct hydraulic down pressure counts. Catalog 839 gives further facts that can help influence your post-war profits!

The Baker Mfg. Co.
506 Stanford Ave., Springfield, Ill.

Here's Why:



This diagram illustrates the hydraulic principle. A 10 lb. force applied to an area of 1 sq. in. in the piston at right (1) is transmitted to act with equal force on each of the 10 sq. in. of piston at left (2). Total pounds pressure per square inch built up by the Baker hydraulic pump multiplied by the area of the cylinders in square inches is the force available to raise the blade or force it into the ground. There is no mechanical principle or combination of principles that can equal this for efficiency, dependability and economy.



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Equipment is de-
signed expressly for
use with Allis-
Chalmers Tractors.

BULLDOZERS SNOW PLOWS

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CONSTRUCTION EQUIPMENT

Tops in —
**DURABILITY,
ADAPTABILITY**
*to the job — and
CONVENIENCE
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For all makes and
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Write for literature
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PERFECTION
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Servicised
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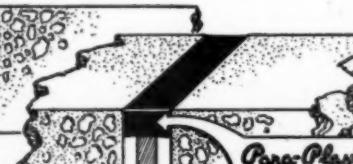
**HOT POURED
SEALING COMPOUND**
Elastic! Permanent! Waterproof!
for EXPANSION JOINTS

★ A Resilient Compound Especially Developed by Servicised for Expansion Joints in Concrete Roadways and other types of Monolithic Construction. Para-Plastic Maintains Bond during Subzero Weather and Will Not Extrude in Summer nor Freeze or Crack in Winter.

Costly Maintenance Eliminated

A concrete Highway or Air Port Runway which has been protected by sealing the expansion and contraction joints with Para Plastic will out-live any similar pavement which has been sealed with ordinary asphalt. Para Plastic Expansion Joints are permanently sealed during all seasons of the year, whereas asphalt seal will ordinarily crack open in winter and allow spring rains easy access to the joint. Expensive maintenance of Expansion Joints is eliminated by use of Para Plastic.

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RUBBER SEAL
Concrete Slab at
Normal Temperature



Para-Plastic Firmly
Bonded to Concrete
During Sub-Freezing
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— Send for Samples —

Send for Catalogue — Ask for Information and Samples. You are also invited to consult our Engineering Department on special problems concerning our method of permanently sealing Expansion, Contraction, and Dummy Joints.



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6051 West 65th Street, Chicago, 38, Ill.



HEIL HI-SPEED Bottom Dump Wagon

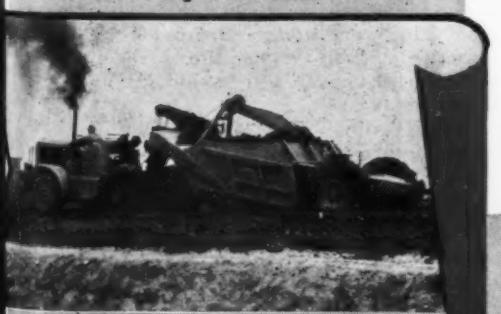
**gives you big capacity...
a seventeen yard load—
and Hi-Speed hauling...
up to 27 miles per hour**



The Heil "engine mounted" Cable Dozer
doing a fast job of tree-doing.



Heil hydraulic dozers give you fast, profit-
able dirt-moving at low cost.



Heil Hi-Speed Cable Scraper is interchangeable
with Bottom Dump Wagon—one power unit.

With the Heil Hi-Speed Trailer Wagon, you cut hauling costs — increase digging output — and reduce maintenance expense. Here's why:

1. **Saves loading time** — big capacity cuts spotting delays; big open top speeds loading cycle.
2. **Cuts hauling time** — quick maneuverability with hydraulic power steer; wide tread, low center of gravity, and high hitch point gives stability for safe operation while traveling up to 27 m.p.h.
3. **Speeds dumping** — power opening doors on clamshell principle give full opening and pull up entirely out of the way while dumping.
4. **Turns short and fast** — non-stop turning radius 19 feet. High clearance permits turning directly off the windrow.
5. **Reduces weather delay** — big tires, well-distributed load, a powerful engine, easy maneuverability — keep this wagon going through all kinds of weather.
6. **Doubles as a scraper** — The 15-yard Heil Hi-Speed Scoop is quickly, easily interchangeable with the dump wagon equipment. By using both scraper and dump wagon, with one power unit, you save capital investment, increase your job capacity, and fit your equipment to lowest cost operation on any dirt moving job.

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R-52

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Spreads forward or backward, in even layers, wet or dry materials, thick or thin, as desired. Spreads full or half width of street. Efficiently handles all materials up to 1". Built for tough road building and maintenance jobs, for ice control, for spreading lime.



Flink spreaders do a better job for definite reasons:

1. **POSITIVE AGITATION** by rugged, simple, finger type agitators.
2. **ADJUSTABLE GATES**, set before spreading, give accurate control of amount spread.
3. **HI CARBON STEEL FANS** scientifically placed and angled, thoroughly "mix" material dropping through gates, deposit it in even layers on spreading surface. No thick and thin spots.
4. **ELECTRICALLY WELDED**. The Flink spreader is a rugged piece of commercial equipment, built of steel, for hard use.
5. **FASTER**. Spreads at 12 to 20 miles an hour. Can be operated by driver from cab who can throw spreader in and out of action as truck is in motion.
6. **NO HELPER**. The Flink is self-feeding. No shoveler on back to "rest up" or "warm up."
7. **DOES NOT LIMIT USE OF TRUCK**. Truck can be dumped same as with regular end gate or spreader can be replaced by original end gate in 5 minutes.

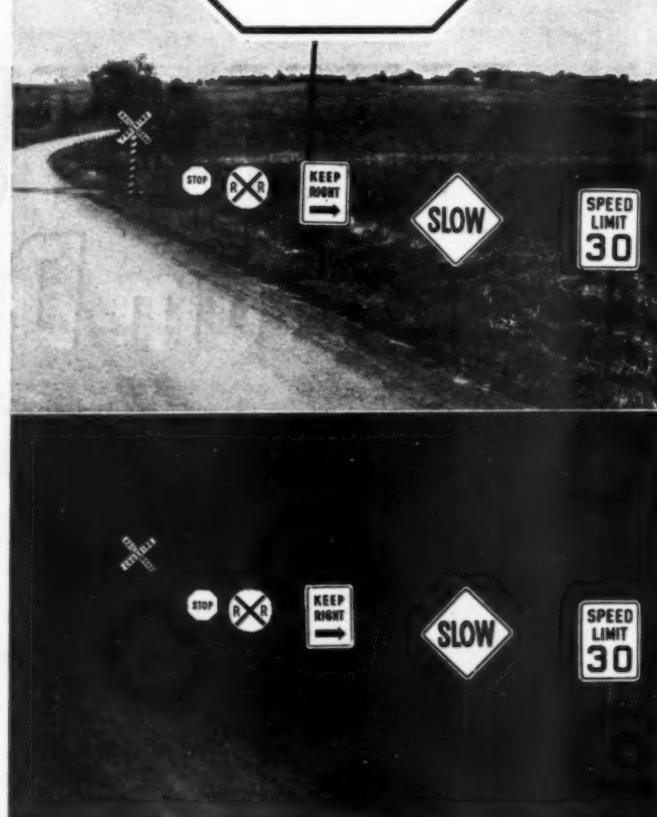
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The FLINK COMPANY

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STREATOR, ILLINOIS

**OVERALL
REFLECTORIZATION
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Scotchlite
MAINTAINS THE SAME
SHAPE OF SIGNS
DAY OR NIGHT**



Overall reflectorization of all types of road and highway signs with Scotchlite gives *every* motorist an accurate "identification on sight" because they retain both their shape and color *day or night*.

Safety engineers along with those charged with the safe control of traffic will find "SCOTCHLITE" helps reduce accidents because of its greater visibility and *instant* attention value.

"SCOTCHLITE" is available in roll form or in made up signs. If you have your own sign shop you'll find it easy to apply to any design. Tests conducted for the past five years have shown this product to be a highly reflective material that withstands weathering without impairment. It should be a part of every well planned safety program.

Reflectorizing your highway signs now with "SCOTCHLITE" will meet today's driving conditions and provide a sign so far advanced that it will be adequate for the post-war era. "SCOTCHLITE" is available in colors of white, silver, red and yellow.

If you're not already using "SCOTCHLITE" why not write for further information today.

"SCOTCHLITE" is the registered trademark of Minnesota Mining & Manufacturing Company



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FWD TRUCK-POWER IS ENGINEERED FOR ALL-SEASON USEFULNESS

FWDs are never out-of-season in highway service. Engineered specifically as Road Maintainers, they have a far greater work range than ordinary trucks. Throughout all seasons, these multi-purpose highway units perform scores of jobs, many of them beyond the line of duty to which trucks dependent on "conventional drive" are limited. The same FWD Road Maintainer that is so effective in spring road conditioning and construc-

THE ONE TRUCK FOR ALL SEASONS

- FALL —Road patrolling; snow fence hauling.
- WINTER —Snow clearing.
- SPRING —Road conditioning and construction.
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THE ORIGINAL EXCLUSIVE BUILDERS
OF FOUR-WHEEL-DRIVE TRUCKS

THE FOUR-WHEEL DRIVE AUTO CO.

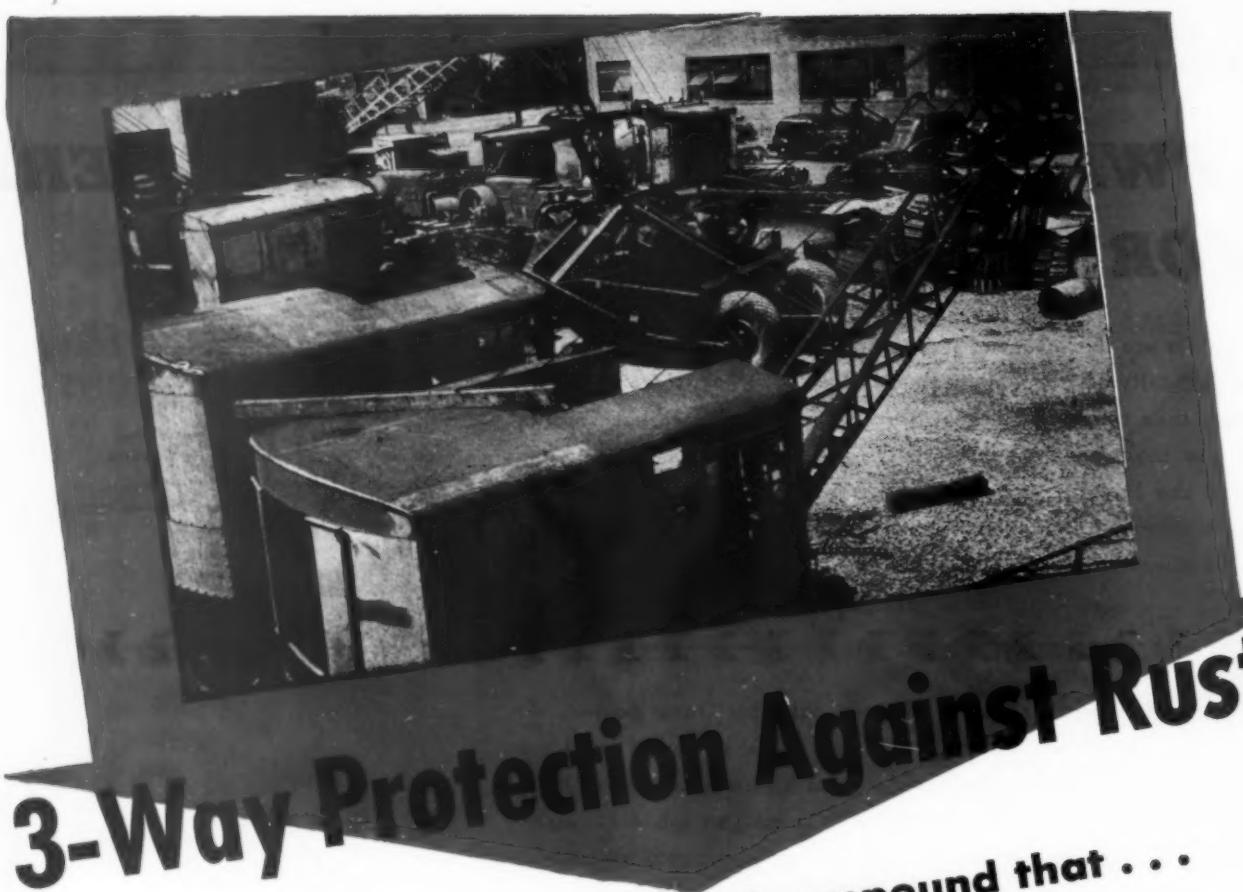
Clintonville, Wisconsin

Canadian Factory: KITCHENER, ONTARIO

FWD Model SU Truck equipped with underbody maintenance blade as recently purchased by city of Muskegon, Michigan.



FWD Model SU



3-Way Protection Against Rust

When you use the rustproof compound that . . .

1. Prevents rust formation on all exposed metal surfaces
2. Penetrates existing rust and stops further rusting
3. Loosens existing rust and makes it easy to remove

IN STORAGE or in use—equipment used by contractors, waterworks and sewage disposal plants needs the positive protection against destructive rust assured by *Texaco Rustproof Compound*. Because one application usually provides year-round protection, *Texaco Rustproof Compound* is very economical.

Texaco Rustproof Compound forms a soft, self-sealing film that remains completely waterproof and is highly resistant to chemicals and fumes under the severest conditions. It can be applied easily to most surfaces with a paint brush, or thinned down and sprayed to reach inaccessible parts. When necessary, it can

be removed quickly with a kerosine-saturated rag.

Because of its proved effectiveness, *Texaco Rustproof Compound* is widely used throughout the construction field, as well as by leading railroads, in metal working plants, marine and refrigeration service, automotive, aviation and chemical industries, and, in general, wherever equipment is subject to corrosion.

Get *Texaco Rustproof Compound* today—available through more than 2300 Texaco distributing plants in the 48 States. Call the nearest one, or write: The Texas Company, 135 East 42nd Street, New York 17, N. Y.



FREE! This 36-page booklet tells why *Texaco Rustproof Compound* prevents rust, where and how to apply it, and how it can add extra years of life to your equipment. A single suggestion in this book may save you thousands of dollars. Write for your copy today.



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TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT—CBS

ROADS AND STREETS, September, 1945 ← Please mention when writing advertisers

ROADS AND STREETS

September, 1945, Vol. 88, No. 9

All-Out Equipment Use Speeds 10½-Mile Road Job

Despite weather and labor difficulties, Potts & Callahan are ahead of schedule on \$2,300,000 Pennsylvania project, believed to be the largest single road contract in progress during the summer of 1945

THE clay here is bad stuff for the scrapers, and the hardpan and shale are worse. WMC cut the request for 350 workers and cut it again. Snow and cold and rain chalked up one of the worst winter and spring seasons a contractor could imagine. Form carpenters deserted the bridges and flocked to an army redeployment project nearby.

In short, everything seemed to go against Potts & Callahan's grading and paving project on U. S. 22 east of Harrisburg, Pa., awarded last October. Yet at the end of seven months, as of June 24, progress of the three work sections was reported 102%, 185% and 100% of schedule.

Why This Speed Was Possible

The reasons for this good showing boil down to three: Potts & Callahan were determined to push the job in all kinds of weather, and did; they used modern equipment to the fullest practicable extent; and they had a nucleus of experienced men who have loyally stayed with this outfit through thick and thin.

There were numerous contributing factors. One undoubtedly is the management advantage of having three adjoining projects under one contractor. The job, which consists of grading a 4-lane arterial divided highway on new location and paving one side all the way and both sides at special

points, had been advertised in three sections, in order to give a wide list of contractors an opportunity to bid. Potts & Callahan were low on all three, and this firm was awarded the contracts with the stipulation that the respective time allowances of 370, 310 and 350 days would have to be met concurrently. In their race to meet these schedules the contractors have clearly demonstrated certain advantages of one long project vs. three independently operated adjoining jobs. They have had one aggregate plant set-up, not three; one fleet of earth-moving equipment which could be flexibly spotted for the best over-all advantage; one paver outfit, which could show lower unit costs than three

Working with a short crew, Potts & Callahan's 34-E dual drum paver has placed as high as 2316 lin. ft. of 12-ft. x 9-in. concrete pavement in 10 hours





Hardpan and shale ahoy! Potts & Callahan have employed snatch tractors on self-powered scrapers, and all the other tricks

Project Outline

CONTRACTOR: Potts & Callahan Contracting Co., Inc., Baltimore, Md.; total of three awards, \$2,248,543 (plus \$70,000 for a slag base on one contract).

HIGHWAY: U. S. 22 east of Harrisburg, Pa., continuation of 4-lane divided highway begun last year. [See R&S, Oct., 1944.] Relocation to replace crooked, hilly section seriously overloaded by 6,000 average daily traffic. Route on direct line into New York City.

JOB INCLUDED: 4.85, 3.45 and 3.35-mile adjoining sections, graded for nominal width of 68 to 72 ft.; paved with 24 ft. of 9-in. concrete on one side, and on both sides near intersections; divisor area to include white cement reflector type curbs; five concrete bridges, including highway grade separation at cloverleaf, and six smaller concrete structures.

separate outfits in placing the 236,000 sq. yd. of concrete pavement.

And there was more flexibility in spotting the available labor, to say nothing of the elimination of pirating between crews.

The job also has been easier as to engineering direction, requiring fewer material and paving inspectors. Altogether, twenty-one inspectors have been used, with a project engineer for

each contract section, and a resident engineer and district construction engineer responsible for the entire job.

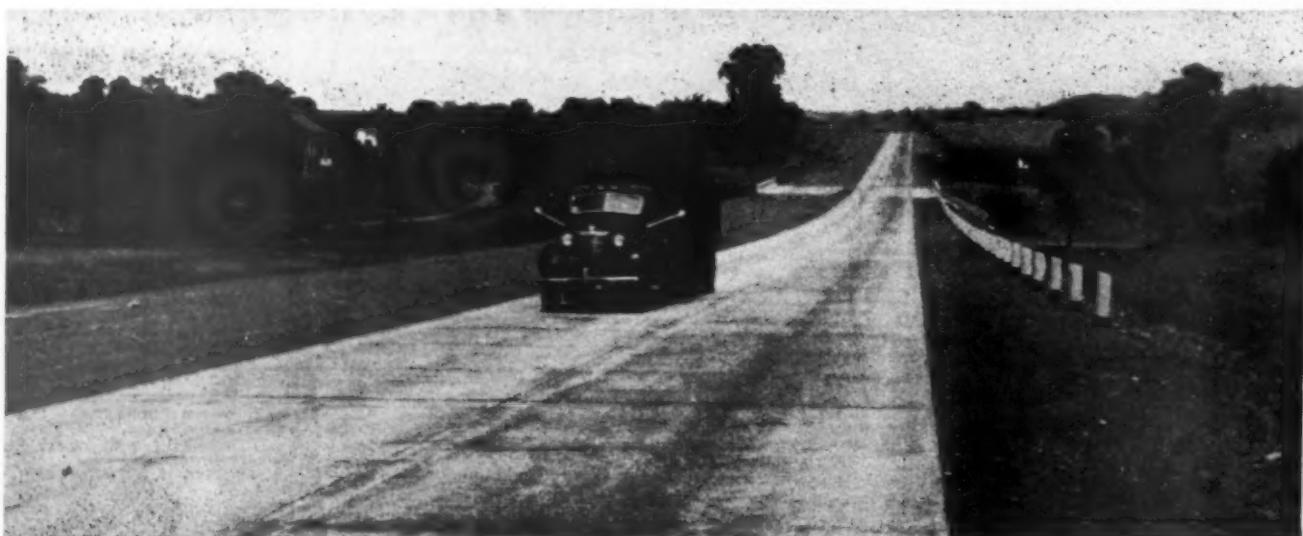
Grading Went on All Winter

By early November Potts & Callahan were in full swing, using clamshells and draglines to excavate for bridge and culvert foundations. Jackhammers, wagon drills, shovels and dump trucks were used in harder

shale, hardpan and occasional rock. And both tractor-drawn and self-propelled scrapers were employed on earth and easier shale. Grading and structure work was pushed hardest through the winter on two projects which had relatively heavy cuts and fills, while holding back until spring on the third section which would have required much shallow grading. About half the 830,000 cu. yd. was done by March, and most of it by June 1, the remainder consisting largely of cuts left to furnish arch culvert backfill material. The largest cut involved was 83,800 cu. yd. Although wet going often slowed the work, little stoppage occurred due to cold weather. On mornings after cold nights, scoops, blades and dozers were used to punch off the frozen crust.

Snatch Loading Used

Six 21-yd. tractor-drawn scrapers have been used for medium and short hauls, and four 15-yd. self-powered, rubber-tired scrapers for longer haul material. Snatch loading is employed as a standard procedure with the latter machines; one tractor or two, depending on the need. This method of loading assistance has proved highly effective, and was especially helpful in hardpan and cuts consisting of shale with some clay. Whereas the normal travel distance for heaped loads with these units in easy ground is about 70 ft., as much as 150 to 200 ft. was required to get a pay load in one cut observed. Loading time ranged from 50 to 135 seconds, and plenty of "smoke" rose from the pans. The snatch tractors worked in both directions or backed up and loaded in one direction only, depending on the way the rigs came up and on whether the load path was level or on grade. Only about 60 seconds' pulling time was



One side paved—4 lanes graded. U.S. 22 relocation section completed in 1944, adjoining present contract



Pneumatic tampers speed backfilling around culvert pipe. This culvert goes under a cloverleaf ramp roadway

lost between hook-ups.

Yardage Data on Self-Powered Units

On one-way hauls averaging 700 ft. in length the 15-yd. self-powered units averaged 14 round trips per 50-minute "hour," taking 3.55 minutes for a complete cycle of load, haul, spread and return. Loads averaged 8 yd. in the 15-yd. bowls, not bad for "mostly shale" material that ran 40% voids in transit. Hourly output averaged 112 pay yards. (These figures for a winter and spring period.)

Sheepsfoot rollers were used on all fills deeper than 5 ft. Optimum moisture for rolling was checked by the rough field test of balling the clay in the hands to see whether it would

stick together or crumble.

Truck Care Aided Job

Shovel cuts have been worked with six shovels, 1 1/4 to 1 3/4-yd. sizes, serving a fleet of 20 to 40 contractor-owned dump trucks. Much of the success of the job is ascribed to the excellence of these machines, which were all of the same make. A special "preventive" maintenance routine is set up for these trucks. Eight or 10 of the trucks are put through a check-up every night, taking the fleet in rotation, so that each truck received a positive going-over once a week, using the contractor's own check list.

Also, every two weeks (when help is available) the undergear of all

trucks is steam-cleaned with a modern pressure cleaning outfit to remove caked mud and dust from springs, dust rings, etc.

The one fly in the ointment on this job has been the scarcity of good truck drivers who will stay with their machines, operate them properly and take real care of them. Oh, yes, there was another—tires. Throughout the job 5 to 10 trucks have had to sit on blocks for lack of truck tires, in spite of priorities.

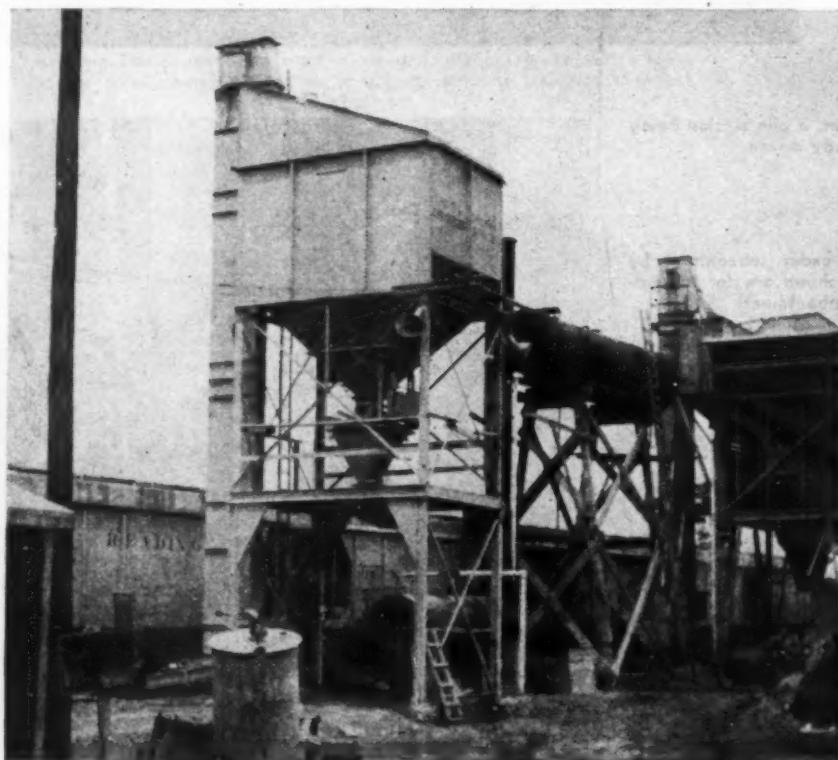
Drainage Ditches Power Dug

Most underdrain and subdrain trenches are being dug with mechanical ditchers in line with the policy of doing all work possible with labor-saving machines. A few hundred feet of ditch through rock or shale have required drilling with wagon drills and blasting and jackhammers to get out local pockets.

Subdrains are specified extensively throughout the project. Side drains consisting of 4-in. tile backfilled with stone are being installed through cuts. Subgrade drains are placed under each pavement joint, drains consisting of lateral stone-filled trenches without pipe, dug 15 in. wide and of variable depth necessary to get drainage slope. Because of dissatisfaction with these drains, 4-in. tile is being installed from the edge of the slab or roadway metal through the shoulders to junctions with the side drains.

As an additional measure to insure satisfactory subgrade, in the presence of a bad frost-heave A-4-7 soil, the grade on one contract section was taken down 6 in. and a blanket of bank-run slag spread full shoulder width.

The engineers are preparing a soil profile of the whole job from borings and surface evidence as grading progresses, as an aid in determining drainage needs and for use as reference in studying pavement conditions and service in later years. Under



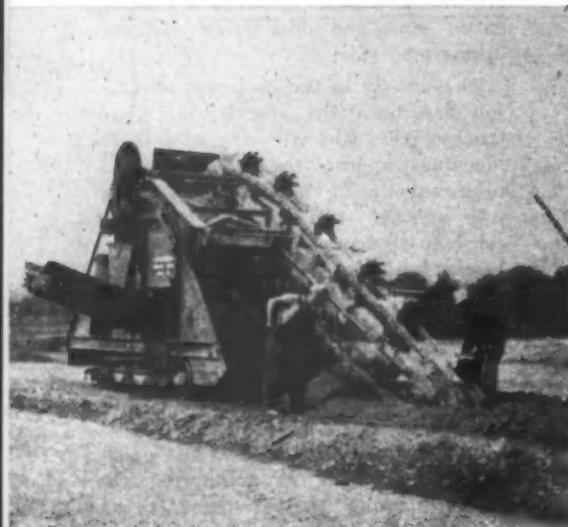
The structural batching plant included an aggregate bin with weatherstripped weighing platform (left), this bin being provided with a cement elevator and an additional weighing beam for handling cement. Note also the boiler and tank for steam heating aggregates



Six shovels are loading to a fleet of 20 to 40 or more dump trucks

Trenching for stone-filled side drains. This machine with operator and two helpers and straw boss have dug many miles of trench

This pass establishes the ditch bottom. Next to raise the blade and dress the 1 to 1 backslope (hardpan and shale). The heaviest models of motor graders were used



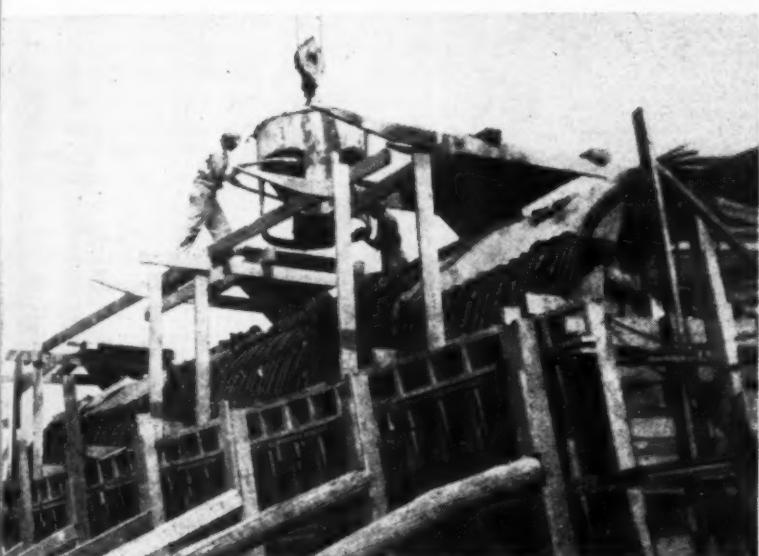
Welder at left is welding splice in the piles. At right, a pile section being lowered and inserted into section already driven

Steel shell piling for one underpass was driven under subcontract by Kelly Pile & Foundation Co., Brooklyn. The piles shown are for a bent-type end pier buried in the approach embankment



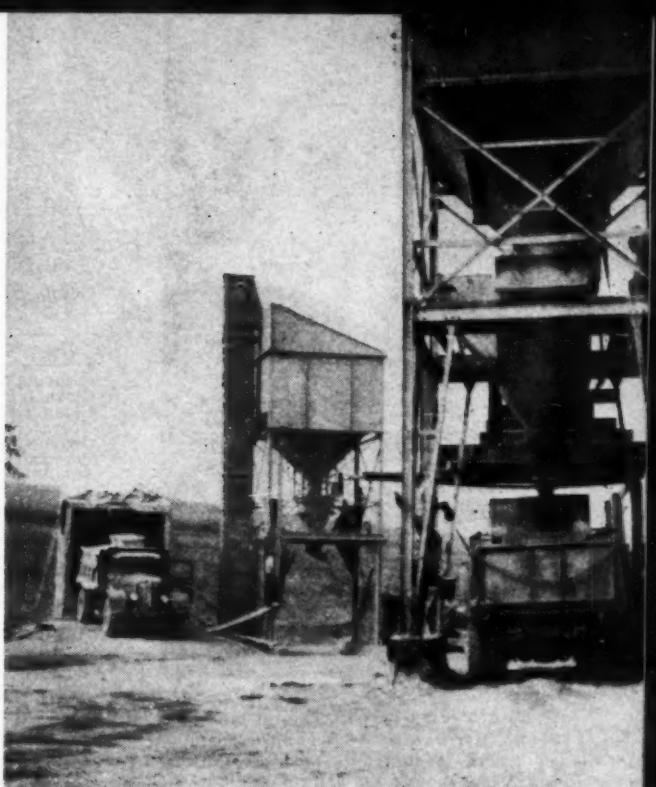
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Concreting one haunch of a rigid frame concrete grade separation span. Note the three chutes spotted for dropping concrete into this half-deck width of abutment wall

Several large concrete earth-filled arches are included in the project. Asphalt impregnated waterproofing cloth is being laid on freshly applied hot asphalt and swabbed over



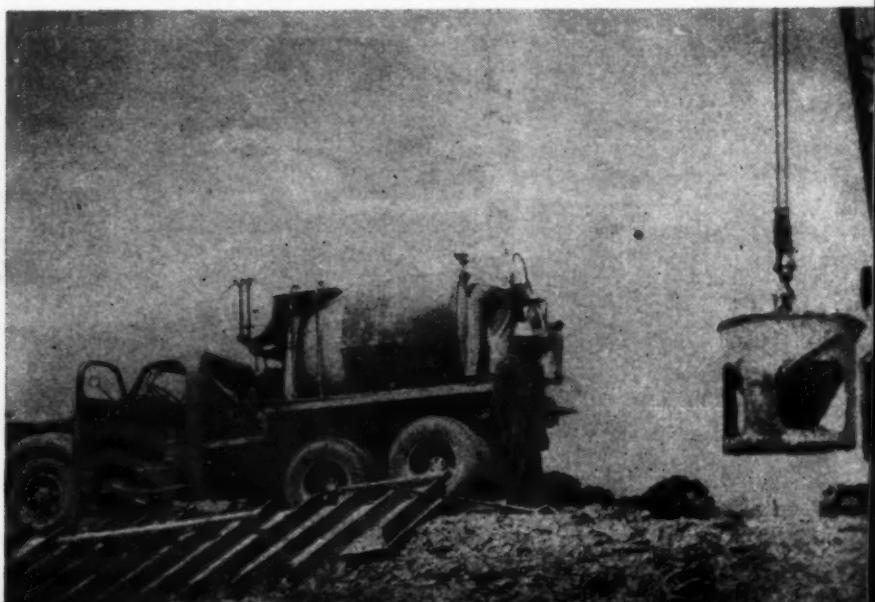
The batching plant for paving. A 3-compartment batch truck getting its stone and sand at the right, after which it will pull ahead for cement. Truck with closed frame body at left is delivering bulk cement into weather-protected hopper

A 2-yd. clam with 60 ft. boom officiating at the pavement batching plant



Meet some of the "execs" on the Potts & Callahan job: Russil S. Conrad, asst. const. engineer; Ralph Wolfe, resident engineer; Karl Chapel, asst. district engineer, all of Pennsy. dept of highways

Concrete was mixed in transit for all structures on the project





Pressure greasing mix trucks with foot-operated outfit — a handy, time-saving type of equipment which relieves the grease truck and speeds servicing of units in the shop yard

drainage is also being placed along the median strip around superelevated curves. Here the outer pavement will drain to inlets spaced every 250 ft. or so along the center zone curb, thence to 6-in. drains running along under the curb to lateral outlets.

Paver Making 2200-2400 Ft. Daily

In spite of labor shortage the paver crew, using a 34-E dual-drum, averaged 2200 ft. per full working day in June with 2316 ft. on the best 10-hour run. Power finishing equipment includes a spreader which strikes off 1½ in. below the top of the forms as a carpet for laying mat reinforcement, a finisher which spreads additional batches, and a longitudinal power float. Dummy joint strips are placed by hand. The job is being done with a notable absence of manipulation of the surface. Hand work consists mainly of a few passes with a long-handled 10-ft. straight-edge, used as a finishing tool to catch minor float marks or spots of excessive surface water. Final

Bids Received Oct. 24 on 4.85 Mile Section

The three lowest bidders were: (1) Potts & Callahan Contracting Co., Inc., 500 West 29th St., Baltimore, Md. (awarded contract); (2) C. W. Good Inc., 726 Columbia Ave., Lancaster, Penn.; (3) The Lane Construction Corp., 37 Colony St., Meriden, Conn. Their unit price bids were as follows:

Description	Quantities	(1)	(2)	(3)
Clearing and Grubbing		\$4,000*	\$3,000*	\$20,000*
Class 1 Excavation	25,694 Cu. yd.	.49	.54	.55
Class 2 Excavation	9,604 Cu. yd.	2.75	2.75	2.25
Borrow Excavation	163,868 Cu. yd.	.49	.45	.30
Crushed Stone	500 Tons	3.00	3.75	3.00
Subgrade	133,845 Sq. yd.	.12	.12	.15
Shoulders	32,967 Lin. ft.	.20	.20	.20
Stone Base Course 8 in.	6,465 Sq. yd.	1.25	1.25	1.50
Stone Base Course 10 in.	992 Sq. yd.	1.50	1.45	1.75
Aggregate Surfacing	355 Tons	3.00	3.00	2.50
Calcium Chloride	4 Tons	50.00	45.00	45.00
Pl. Conc. Pav. 6 in.	1,978 Sq. yd.	2.50	2.70	2.75
Reinf. Conc. Pav. 8 in.	2,294 Sq. yd.	2.85	3.16	3.00
Reinf. Conc. Pav. 9 in.	121,581 Sq. yd.	2.99	3.16	3.15
Sp. Reinf. Conc. Pav. 9 in.	535 Sq. yd.	3.50	3.00	4.25
Pl. Conc. Surf. Bridge Floor	2,634 Sq. yd.	2.00	2.30	1.50
Bitu. Surf. Course	248 Tons	8.00	9.50	9.00
Bitu. Surf. Course, 2 in.	5,376 Sq. yd.	1.10	1.10	1.00
Class A Concrete	3,658 Cu. yd.	37.00	36.00	43.00
Class B Concrete	3,730 Cu. yd.	25.00	26.00	28.00
Plain Steel Bars	1,059,703 Lb.	.053	.05	.06
Plain Structural Steel	42,680 Lb.	.07	.06	.06
Fabricated Structural Steel	80,200 Lb.	.12	.17	.12
Stone Backfill for Structure	30 Cu. yd.	8.00	3.80	6.00
4-43 ft. Con. Test Piles		1,720*	950*	750*
44 ft. Concrete Piles	264 Lin. ft.	6.00	5.00	3.50
38 ft. Concrete Piles	380 Lin. ft.	6.00	5.00	3.50
32 ft. Concrete Piles	508 Lin. ft.	6.00	5.00	3.50
Pressure Grout Surfacing	184 Sq. yd.	9.00	6.00	7.00
Mortared Stone Slope Wall	620 Cu. yd.	23.00	26.00	15.00
Mortared Stone Slope Wall	64 Cu. yd.	30.00	26.00	20.00
Class B Conc. Pav.	11 Cu. yd.	30.00	30.00	40.00
Grouted Rubble Pav.	64 Cu. yd.	20.00	22.00	25.00
Type F-1 Endwalls incl. Rails	2 Each	200.00	165.00	200.00
Type F-2 Endwalls inc. Rails	15 Each	200.00	150.00	190.00
Special A Endwalls	2 Each	200.00	115.00	175.00
Type D Inlets	7 Each	150.00	105.00	150.00
Type E Inlets	18 Each	125.00	85.00	140.00
Type G Inlets	9 Each	125.00	115.00	165.00
Type H Inlets	8 Each	125.00	200.00	175.00
15 in. Reinf. Cone. Pipe	1,020 Lin. ft.	2.75	3.00	2.50
18 in. Reinf. Cone. Pipe	2,444 Lin. ft.	3.50	4.00	3.25
24 in. Reinf. Cone. Pipe	2,022 Lin. ft.	4.50	5.50	4.50
30 in. Reinf. Cone. Pipe	306 Lin. ft.	6.50	8.50	6.25
36 in. Reinf. Cone. Pipe	506 Lin. ft.	7.00	7.00	6.00
48 in. Reinf. Cone. Pipe	126 Lin. ft.	12.00	11.60	10.00
72 in. Reinf. Cone. Pipe	36 Lin. ft.	21.00	21.70	25.00
36 in. Ex. Str. Reinf. Conc. Pipe	672 Lin. ft.	7.50	7.70	6.50
15 in. Pl. Cone. or V. C. Pipe	234 Lin. ft.	2.40	2.60	2.25
24 in. Pl. Cone. or V. C. Pipe	104 Lin. ft.	3.90	5.10	4.00
30 in. Pl. Cone. or V. C. Pipe	110 Lin. ft.	6.00	7.90	6.00
36 in. Pl. Cone. or V. C. Pipe	60 Lin. ft.	6.50	6.60	6.00
18 in. Reinf. Cone. Pipe Relaid	42 Lin. ft.	2.00	2.60	3.00
4 in. Tile Underdrain	20,500 Lin. ft.	1.00	1.10	1.00
6 in. Tile Underdrain	180 Lin. ft.	1.20	1.20	1.25
4 in. Tile Found. Underdrain Type A	4,900 Lin. ft.	.90	.95	1.00
4 in. Tile Outlets	800 Lin. ft.	.90	1.05	.75
6 in. Tile Outlets	124 Lin. ft.	1.20	1.15	1.00
White Conc. Reflect. Curb, Type A	428 Lin. ft.	1.50	1.80	1.25
White Conc. Reflect. Curb, Type B	34,944 Lin. ft.	1.55	1.90	1.50
Subgrade Drains	25,300 Lin. ft.	.50	.40	.60
Grouted Rubble Gutter	32 Sq. yd.	5.00	5.75	5.00
Pl. Cem. Cone. Gutter, Type "C"	807 Sq. yd.	3.50	3.35	5.00
Guard Posts	1,078 Each	5.00	5.50	5.00
Shoulder Baffle	8,192 Lin. ft.	.25	.28	.50
Shoulder Trough	1,433 Lin. ft.	1.00	.60	1.50
8 ft. dia. Found. Columns	116 Lin. ft.	50.00	56.00	55.00
Totals		\$1,225,752	\$1,278,442	\$1,290,980

*Lump sum bid.

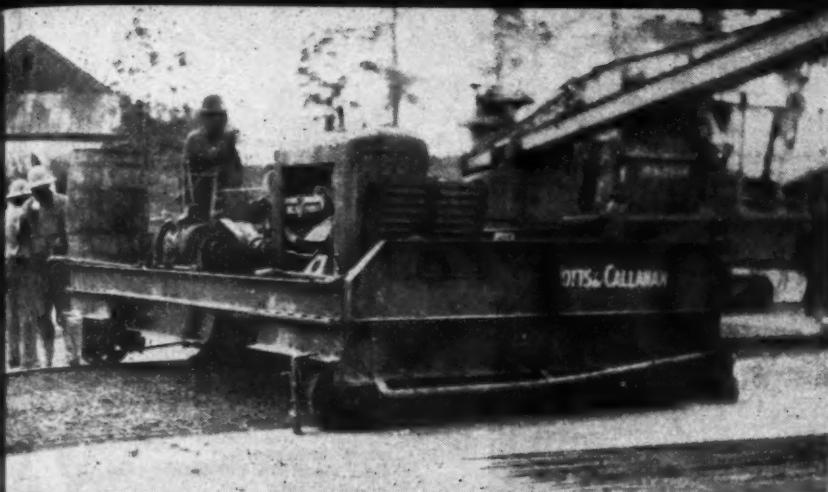


"We need tires," is the mute plea of these trucks, and brother, they do!

finish is made with a canvas drag fastened to a moving bridge. Membrane curing materials are applied from a power spray cart.

A power form grader, form tamper, and subgrader are employed ahead of paver, and labor is further saved by driving form pins with a jackhammer and pulling them by a wheel-mounted hand puller. Pre-assembled expansion joints consist of conventional capped dowels and premoulded strips.

The slab design, by the way, consists of 9-in. uniform thickness of concrete mat reinforced. Expansion joints are spaced 120 ft. and one trans-



(Left): The spreader strike-off is set $1\frac{1}{2}$ in. below the top of the forms, bar mat reinforcement placed, and additional concrete spread by a power finisher. (Right): Burlap drag finish, suspended from the dummy joint bridge

verse dummy joint spaced midway instead of the usual 15 or 20 ft. Tie bars are specified at the keyed longitudinal center joint.

The engineers here have observed extra precautions against early, severe use of the first pavement strip laid. Analysis of condition survey data reveals that the first lane paved on numerous projects has shown joint defects and other deterioration sooner than the other lane. This fact is ascribed to the early passage of batch trucks and more particularly to the edge loads and impact imposed by heavy finishing equipment while paving the adjoining lane.

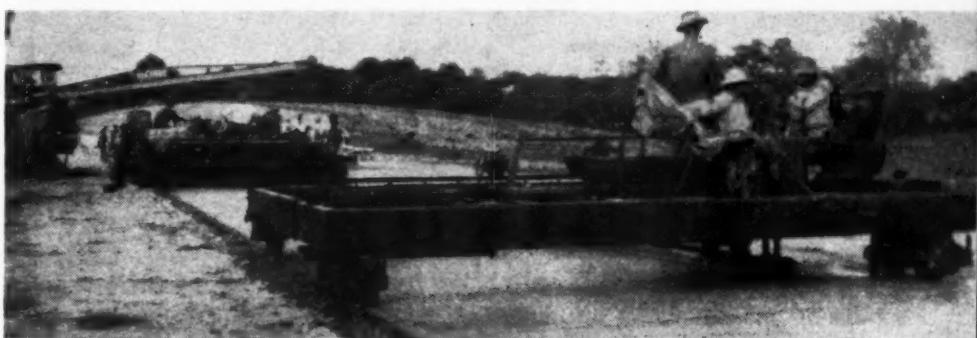
The paver is served on this job by heavy dump trucks equipped with three batch compartments and separate cement containers. While these trucks have kept idle paver time to a minimum, some of the contractor's men feel that smaller 2-batch trucks would lend greater flexibility and be more easily maneuvered at the paver.

Dual Material Plant Set-Up

Two concrete material plants serve this project, one for structures and one for the paving. The paver batching plant, located along the grade, includes a dumping hopper for bulk cement trucked from the structural materials plant. As shown in one of accompanying photos, this hopper is covered with a 3-sided frame structure, the third side being left open for the trucks to back into, and covered at night or during rains by dropping a tarpaulin. Stockpiled aggregates are also trucked to this plant, which batches into the 3-compartment trucks.

The structural materials yard, located at a rail side, includes two bulk cement elevators. The second elevator was installed in case extra speed was needed to offset weather delays on the earth-filled arches, where grading progress was at stake. Sand as well as cement came by rail.

The second elevator has seldom



Then comes a longitudinal power float, frugal use of a long handled straight edge as a finisher, burlap drag, dummy joint installation (at 120 ft. intervals alternating with expansion joints) edging trowel and membrane wire

been used, and bin and weighing hopper in connection are employed for aggregates. The hopper scales were provided with four weighing beams set at four rates for convenience in handling cement or various aggregates.

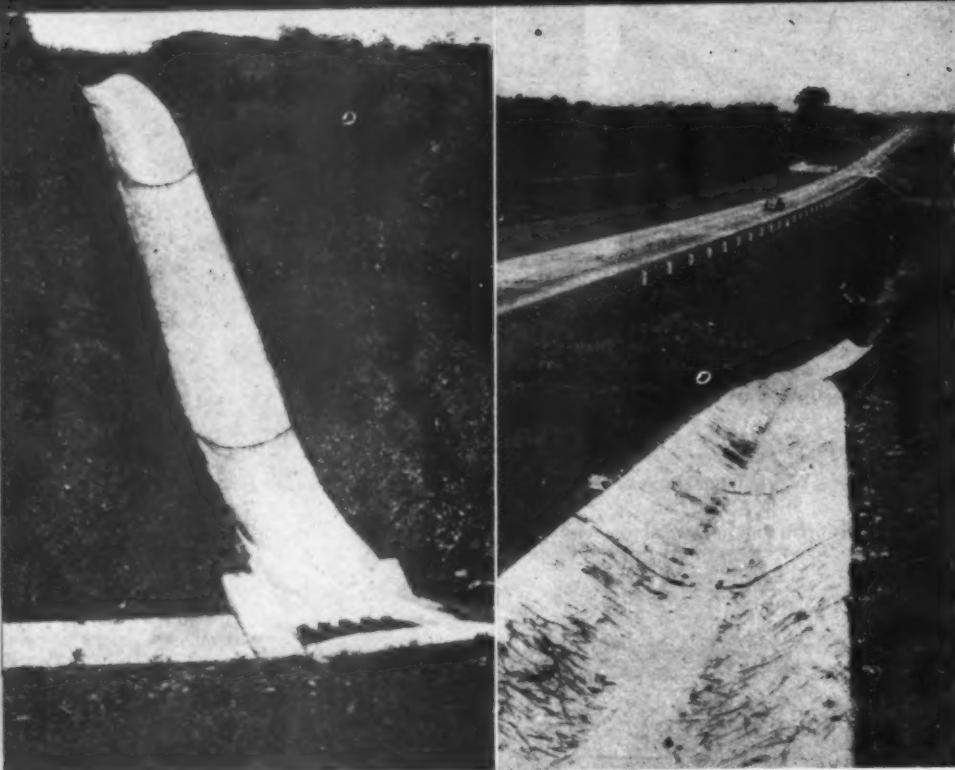
A boiler and water tank for steam heating of aggregates (see photo) was set up here as protection during March, when materials from this plant were to be used on early concrete bridge footing. Summer-like weather made this installation unnecessary.



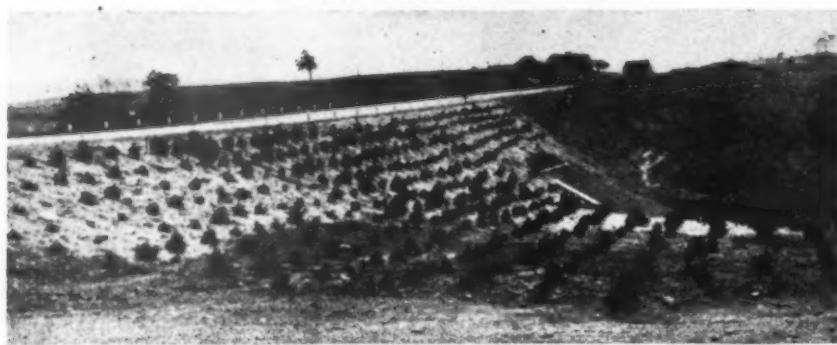
Potts & Callahan's field shop—a good-sized place as highway contractor shops go

Bodies up for greasing. Part of a fleet of 45 dumps of a single "make" and having similar body and hoist. A daily routine assured each truck a complete going-over once a week





Typical concrete run-down and intercepting ditch at shale cut. Considerable footage of ditch pavement was built through steeply banked shale cuts. Note heavy rail grating in inlet



Teelets set out by the Pennsylvania highway engineers to landscape slope and help prevent erosion. Installed near an intersection where beautification is most observed and appreciated



Potts & Callahan's Equipment at Peak of Operations

- 6—Shovels 1½-1¾ yd.
- 5—Clamshells and cranes
- 4—15-yd. self-powered scrapers
- 6—21-yd. tractor-drawn scrapers
- 14—Heavy bulldozers
- 2—Light clean-up bulldozers
- 2—Push tractors
- 2—Heavy rooters
- 6—Motor graders
- 12—Sheepsfoot rollers, dual drum
- 3—Smooth rollers (two 10-t., one 5-t.)
- 15—Dump trucks, earth-moving (and batch)
- 9—Other trucks (batch and pick-up)
- 6—Compressors (from 105 to 420 cu. ft.)
- 8—Pneumatic hand tampers
- 1—Ditching machine
- 4—4-in. centrifugal pumps
- 12—2-in. centrifugal pumps
- 4—Wagon drills
- 10—Jackhammers
- 4—Paving breakers
- 2—Portable light generators
- 2—Welding machines
- 1—34-E dual paver
- 1—27-E single drum paver (standby unit for structures and paving; never used)
- 1—Mechanical paving spreader
- 1—Finishing machine
- 1—Longitudinal power float
- 1—Power formgrader
- 1—Form tamper
- 1—Mechanical finegrader
- 1—Mechanical ditcher
- 1—Curling spray machine
- 7—14-in. rubber-tired tractors
- 5—Power saws for bridge forms
- 8—Concrete puggies
- Several ready-mix trucks
- 1—Service truck

Principal Quantities

- 830,000 cu. yd. Class I excavation
- 236,000 sq. yd. reinf. concrete pavement (9 in.)
- 9,673 sq. yd. bit. surface course (approaches)
- 13,461 sq. yd. cr. agg. base (8 or 10 in.)
- 66,695 sq. yd. shoulders
- 255,964 sq. yd. subgrade
- 59,600 lin. ft. subgrade drains
- 55,840 lin. ft. tile underdrains 'roadway and br. fd.)
- 66,504 lin. ft. white cem. repl. curb
- 5,126 cu. yd. Class A concrete
- 9,467 cu. yd. Class B concrete
- 1,555,099 lb. steel reinf. bars

Acknowledgment

The foregoing job, due to be completed late in 1945, is a Federal-aid project, in the Harrisburg district of the Pa. Department of Highways. John L. Herber, chief engineer; C. R. Forbes, district engineer; K. F. Chapel, assistant district engineer in charge of construction; R. S. Conrad, assistant engineer, and Ralph Wolfe, Jr., resident engineer. Potts & Callahan Construction Co. is represented by Philip Turner, superintendent, and Mr. Scott on paving.

[Editor's Note: Space limitations prevent mention of other interesting features of this project, some of which are depicted, however, in the accompanying illustrations.]

Inlet design used along white cement reflector-type center curb where superelevated pavement drains inward

Editorial

Anti-Diversion Fight Showing Results

CONGRATULATIONS, Wisconsin, on your new law, which provides for the segregation of highway-user tax funds into a trust fund for use only on the highways.

Wisconsin's victory is perhaps the most notable one in the anti-diversion fight, but by no means the only one. Maryland, Pennsylvania and Texas legislatures took action this year on constitutional amendments prohibiting or restricting the use of highway user revenues for non-highway purposes. The amendments are to be voted on in 1946. The Maryland and Pennsylvania proposed amendments reserve all funds.

Kentucky citizens will go to the polls on an anti-diversion amendment this Autumn. These four states, if successful, will swell to twenty the number of states having so amended their constitutions.

Not all the tries were successful, however. An anti-diversion amendment in Illinois was nullified to a mere resolution at the last minute. The Connecticut legislature didn't get around to putting up to the voters an amendment that had been hanging fire for a couple of years. Utah, Delaware, New Jersey and Rhode Island also flunked out on their proposed amendments. Georgia considered such a bill, which may come up again in 1946. The Utah tussle did result in restricting vehicle registration fees for road purposes, but failed to so restrict gas tax funds.

This whole subject has long been of such vital concern that we unhesitatingly call diversion our national Highway Problem No. 1. It is even more important today, because the vast job of rebuilding the highways first of all takes money, and wage and material costs are certain to remain high for a while. State officials and legislators who are hostile to the idea of earmarking state funds must be convinced with all the factual data and sound reasoning that can be brought to bear. Here is a great, continuing opportunity for public service by newspaper editors and other leaders.

Tell Your Editors

ONE of the campaigns that must never let up among highway people is that of keeping the public straight on the soundness of federal highway aid.

As the postwar events gather pace there is sure to be a strong anti-federal-spending sentiment. No thoughtful highway engineer wants to see the nation's

business reconversion job left to government pump priming or bureaucratic initiative. As so clearly emphasized by facts released by the Committee on Economic Development recently, the future prosperity of our country, including road-builders, finally will depend on private enterprise.

But federal aid for highway development is something special and apart from the general run of federal spending, because of the basic public function of the highways, and also because federal-aid is merely a return of funds to highway users that were taken from highway users in the form of motor vehicle excise taxes and federal gas taxes.

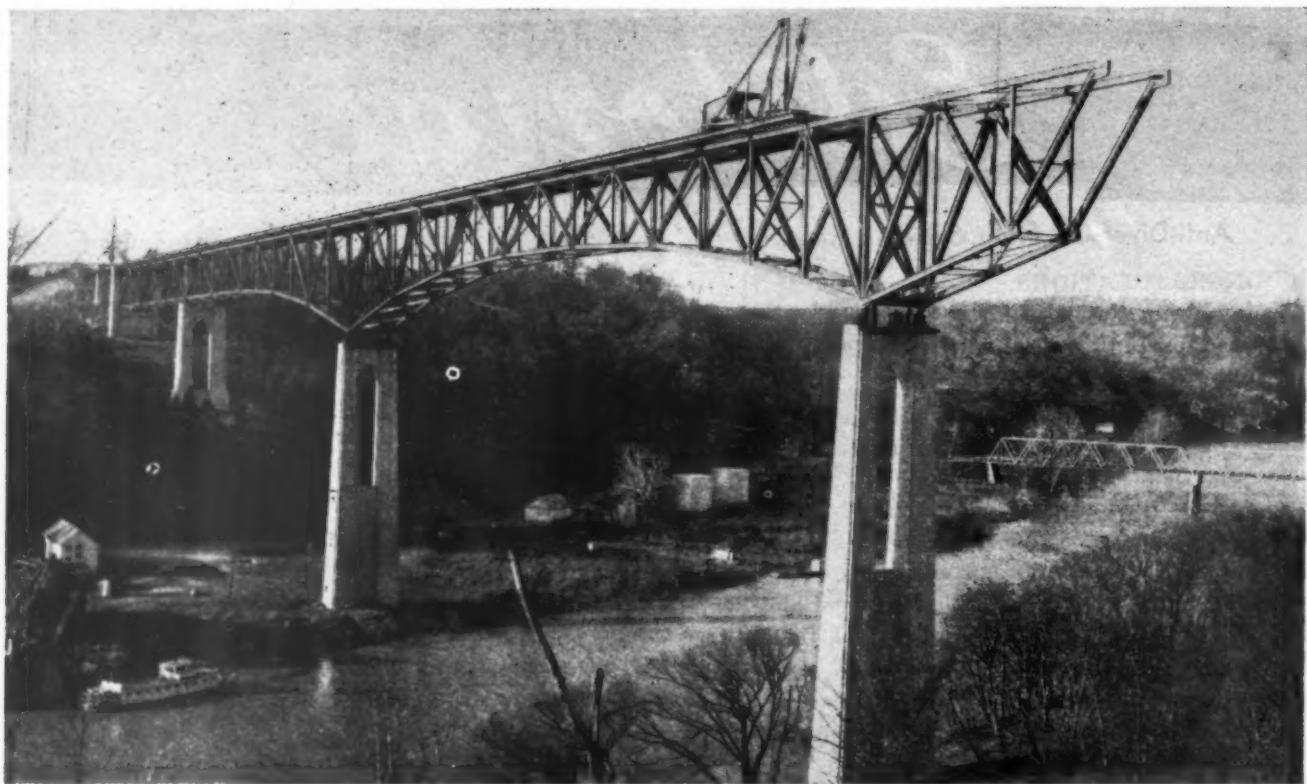
Disappointment has been expressed in several quarters at the lack of stir created by the splendid review of a quarter-century of federal aid, as presented in several papers at the AASHO convention last November. The papers were heard intently enough by those present. But few copies of the reprinted talks ever got into the hands of newspaper editors. Every editor in the land should have this reprint, and be sold on the significance of its story in terms of the new roads this country will or will not have in the postwar motor age, depending on wise fiscal policies. This reprint, "The History and Accomplishment of 25 Years of Federal Aid for Highways," is available to county, city (and state) officials and others at the American Association of Highway Officials headquarters, National Press Building, Washington, D. C.

Who's Doing Our Selling?

A LOT of different people have to keep campaigning for action in highway development, it seems—everybody except the poor working stiffs, meaning the contractor and his superintendent, and the rank and file of highway engineers.

Latest agency to undertake a real selling campaign to build a fire under lethargic officials is the Studebaker Corporation. In two score national magazines and publications reaching directors and transportation people, this manufacturer is dramatizing the cost of urban congestion in terms of hours lost in a truck driver's personal day and with other personal, close-to-home appeals.

It is understood that these ads in at least one instance helped city engineers win direct action from councilmen on needed street widening and other improvements.



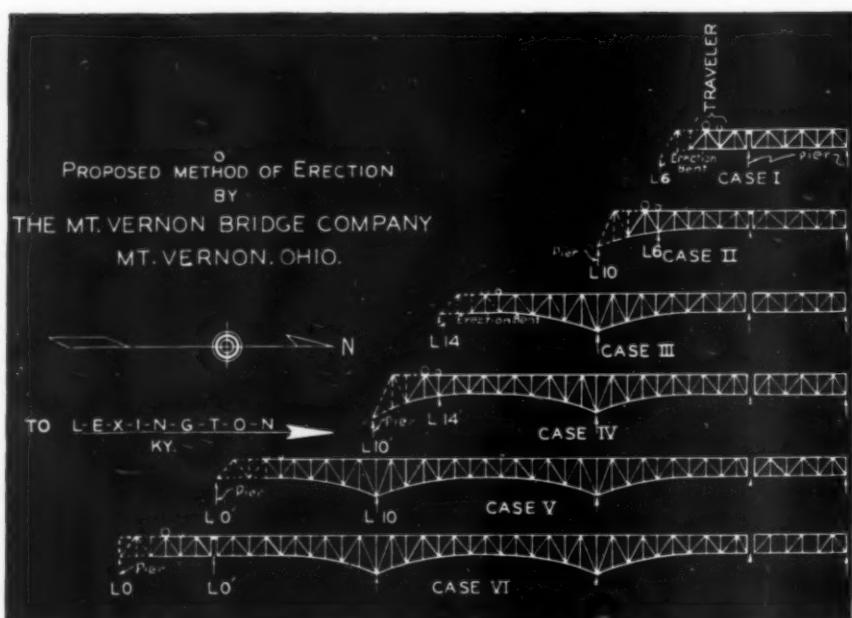
A continuous 3-span system, 1,088 ft. in length, forms the central portion of this bridge

Highest Highway Bridge East of the Mississippi River

Traveler used to erect truss members for Kentucky structure which will carry US 25 traffic 250 ft. above river; tall piers concreted with 110 ft. stiffleg boom; pier reactions of continuous trusses to be checked with hydraulic jacks

HIGHEST structure of its kind in the U. S., and highest highway bridge east of the Mississippi, the Clay's Ferry bridge on U. S. 25 south of Lexington, Kentucky, was expected to be completed this year. The bridge will replace an obsolete low-level wrought iron bridge which has served this Kentucky river crossing since 1869. Whereas traffic heretofore has had to negotiate hairpin turns and steep grades to get in and out of the river gorge at this point, it will now flow straight across on an unbroken 3% grade.

The bridge consists of a 3-span continuous deck-type steel Warren truss, spans 320 ft., 448 ft. and 320 ft., flanked by a 192-ft. simple Warren span on each side, plus a total of five 50-ft. simple concrete girder approach spans—1,736 ft. total length. A 26-ft. clear roadway and 3-ft. sidewalks will be carried on trusses spaced 22½ ft. center to center.



The erection method proposed and used without change

The bridge was worked out architecturally before it was designed structurally, pleasing appearance being a factor in selecting the Warren truss. Detailed studies indicate that the structure as designed is the most practicable and economical for this location.

How High Piers Were Concreted

Piers are of open-spandrel concrete construction, representing considerable design study and comparison with high piers in service. The entire structure is founded on solid limestone. Maximum foundation pressures will not exceed 20,000 lb. per sq. ft.

Pier No. 6, the highest, will be described briefly as typical of pier design and construction. With a height of 198 ft. from the bottom of the pier footing to the cap, it contains 3,800 cu. yd. of concrete. The rock under this pier was faulted across the entire footing area, and the rock strata dip at 45°. The rock was explored by drilling 20-ft. holes to determine its suitability as a foundation.

This pier's bankside location required a cofferdam, built of 50-ft. steel sheet piling. The three lower tiers of wales and struts were of steel construction; upper tiers, of timber. Two 4-in. pumps were required to unwater the cofferdam. Concreting of the shafts was completed uneventfully in two lifts, using a timber-pile-supported stiffleg derrick with a boom extended to 150-ft. maximum length for the top lift.

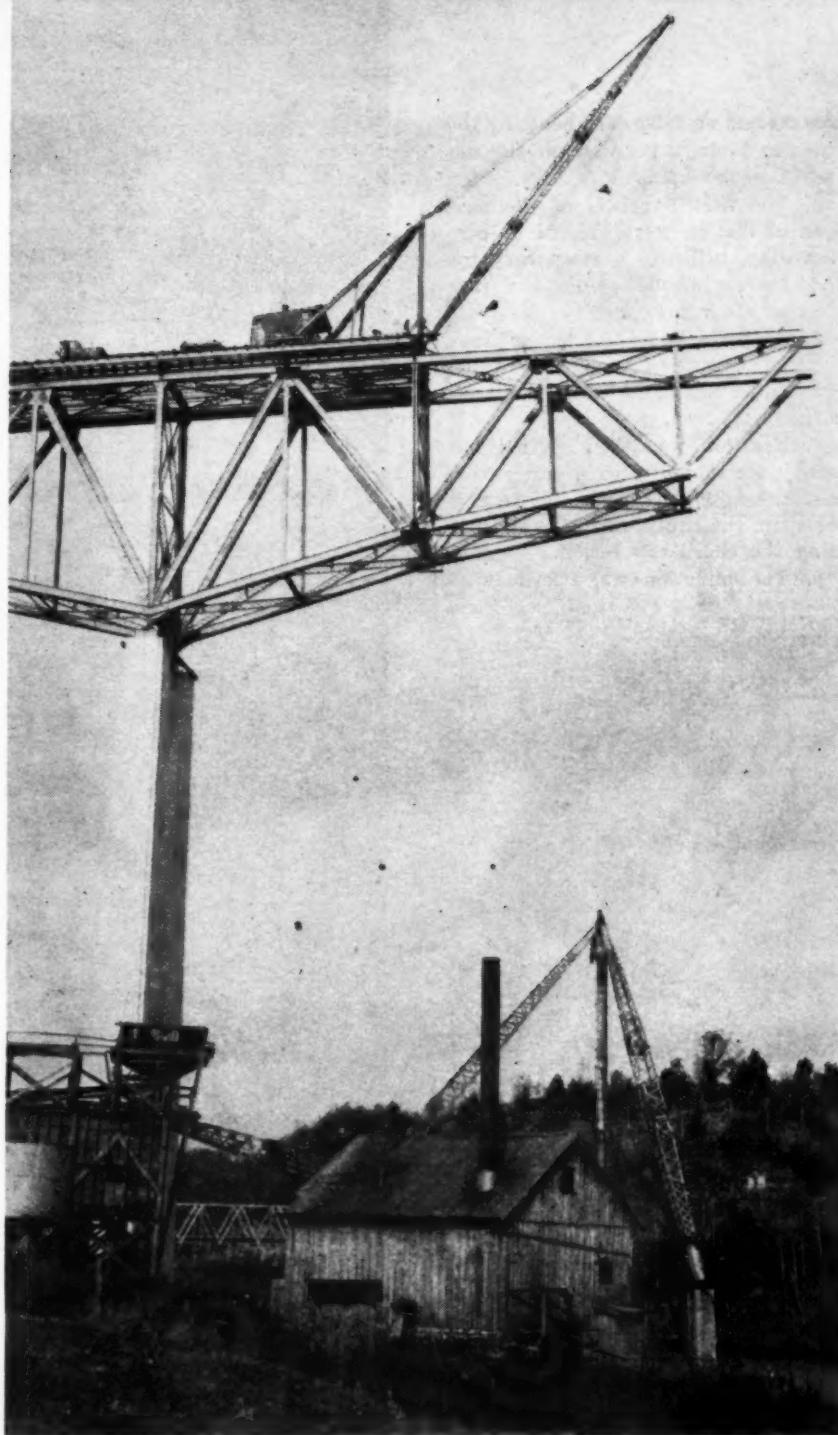
The entire bridge, including deck, required 12,500 cu. yd. of concrete and 1,200,000 lb. of reinforcing steel.

Steel Erection Procedure

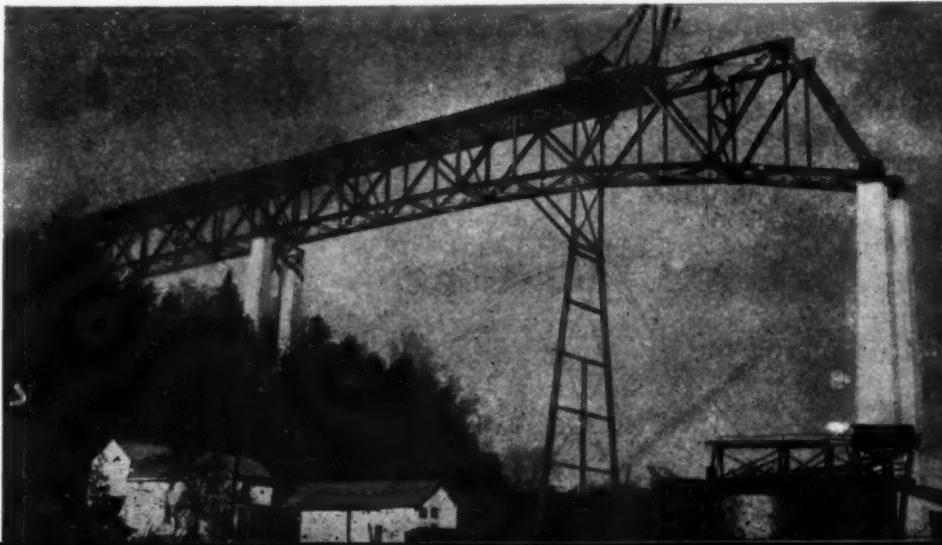
The method proposed by the structural steel contractor, Mt. Vernon Bridge Company, in presenting its bid, was used successfully with practically no change. Working progressively from the northern end, steel was erected by cantilevering forward, using a wheel-mounted, steam-operated stiffleg traveler. The traveler rode highways on the steel stringers of the floor system. Steel clamps were required to hold the legs to the stringers to prevent uplift. A 110-ft. boom of 50-ton lifting capacity was fitted with blocks which provided a 17-part line for the heaviest assembly sections.

The method and sequence of erection can be described as follows:

1. Two temporary approach steel girder spans on the north were placed, and the 192-ft. simple span



Cantilevering required temporary counterweighing. Note details of traveler; stiffleg below used to put up pier and handle erection bent



Erection pier in 1st position (L-10)

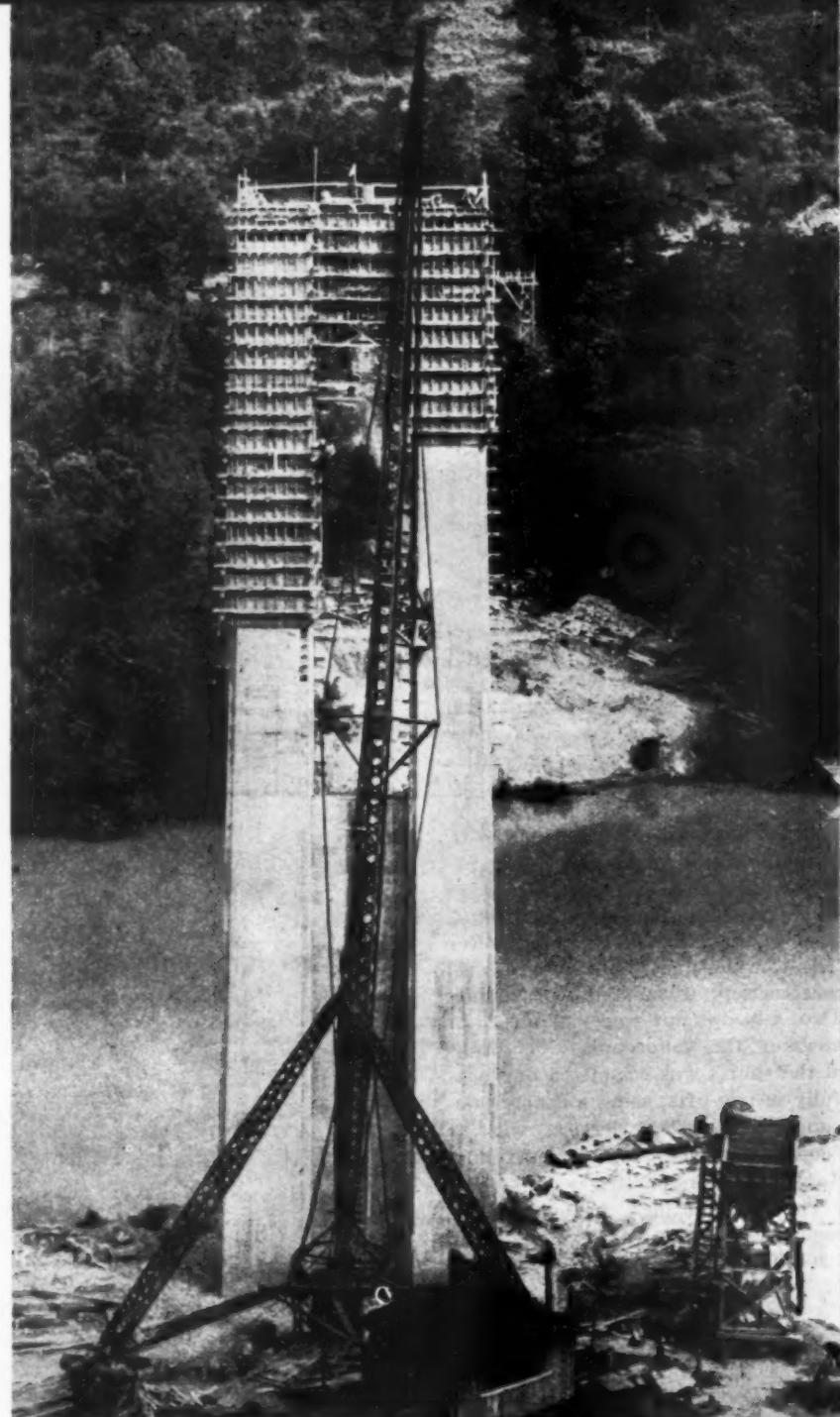
was erected on falsework bents by the traveler from a position on the adjacent girder span.

2. The first 6 panels of the next span of 320 ft. were erected by cantilevering, utilizing a temporary top and bottom chord connection (see erection diagram).

3. At this point a slender steel erection pier was set up (L-6 in diagram), the top chord connection temporarily relieved.

4. Erection was then carried forward past the next pier, and on out past the midpoint of the 448-ft. center span, the cantilevering again utilizing the chord connection.

5. The erection falsework was



A derrick with 150-ft. boom, mounted on a platform, handled forms and concreting of the tallest piers

The erection bent consisted of steel members later used in the permanent bridge

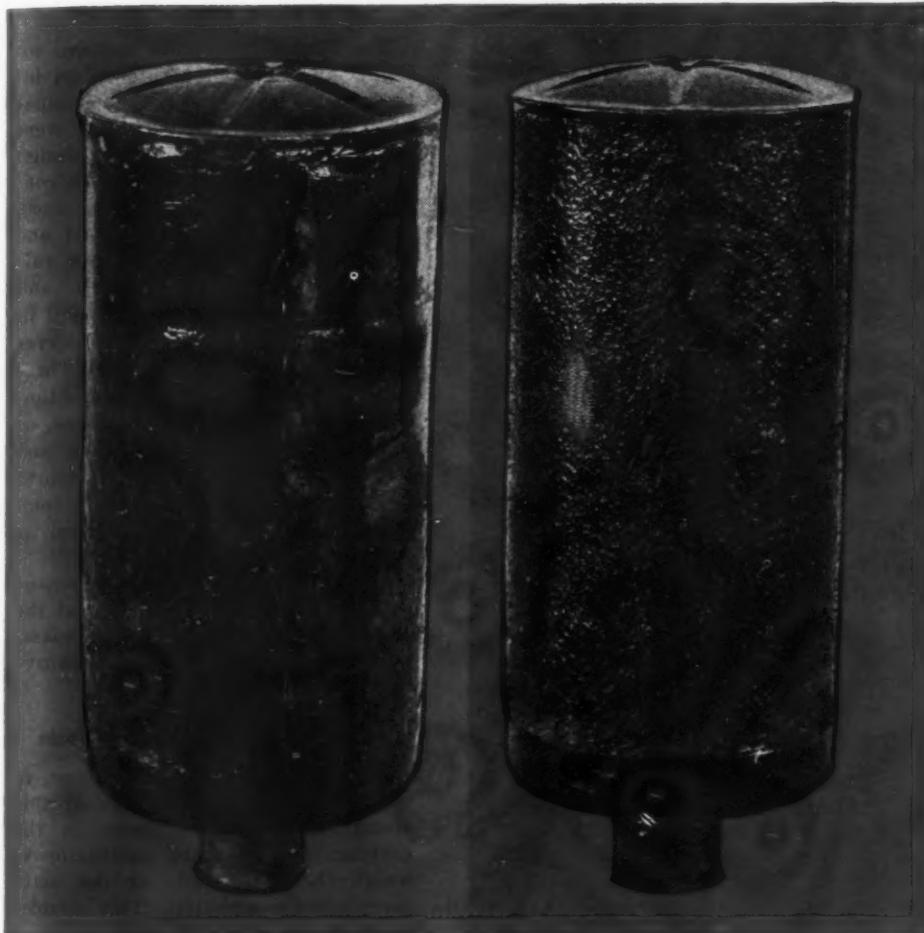
moved to new position L-14 and cantilevering continued past the next pier to within three panels of the far end of the 3-span continuous central system. Fabricated members for the last three panels were then set and the cantilevering stresses relieved.

6. The 192-ft. simple truss at the far or southern end was placed by again cantilevering forward with the aid of top chord connectors.

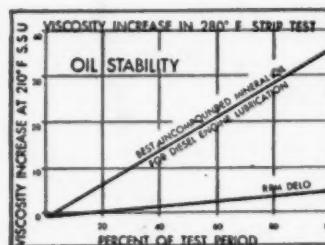
The erection pier, shown in the ac-

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How RPM DELO OIL stops filter clogging



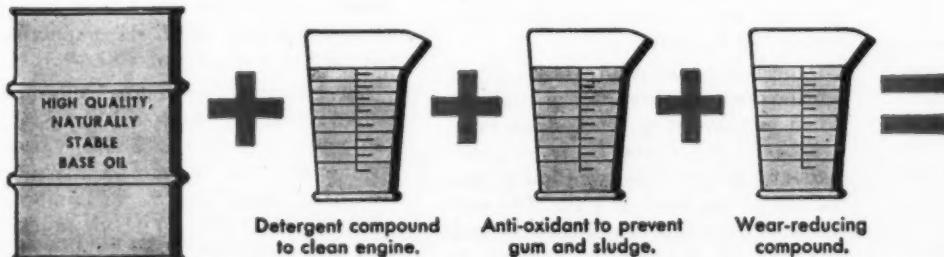
Powerful Anti-Oxidant
effects of compounding material in RPM DELO Oil are graphically illustrated by cleanliness of this filter after 500-hour test under heavy duty conditions. Inherent stability of selected base stocks in RPM DELO Oil, plus detergent compounds assure minimum engine deposits, prevention of many costly shutdowns.



This Is How uncompounded oil clogged a regular commercial filter element after only 204 hours in a test run. The shiny sludge deposit is the result of oxidation of oil, plus iron, silica and water. In actual use, a clogged filter can result in stopped-up oil passages and excessive crankcase sludge, necessitating expensive overhauls for cleaning.

Same Type Filter from the same engine, operated on RPM DELO Diesel engine lubricating oil looked like this after 1234 hours. There is little deposit, oil flow is unimpaired. RPM DELO Oil prevents filter clogging two ways: 1. By maintaining piston rings in free working condition. 2. By minimizing oxidation of oil itself.

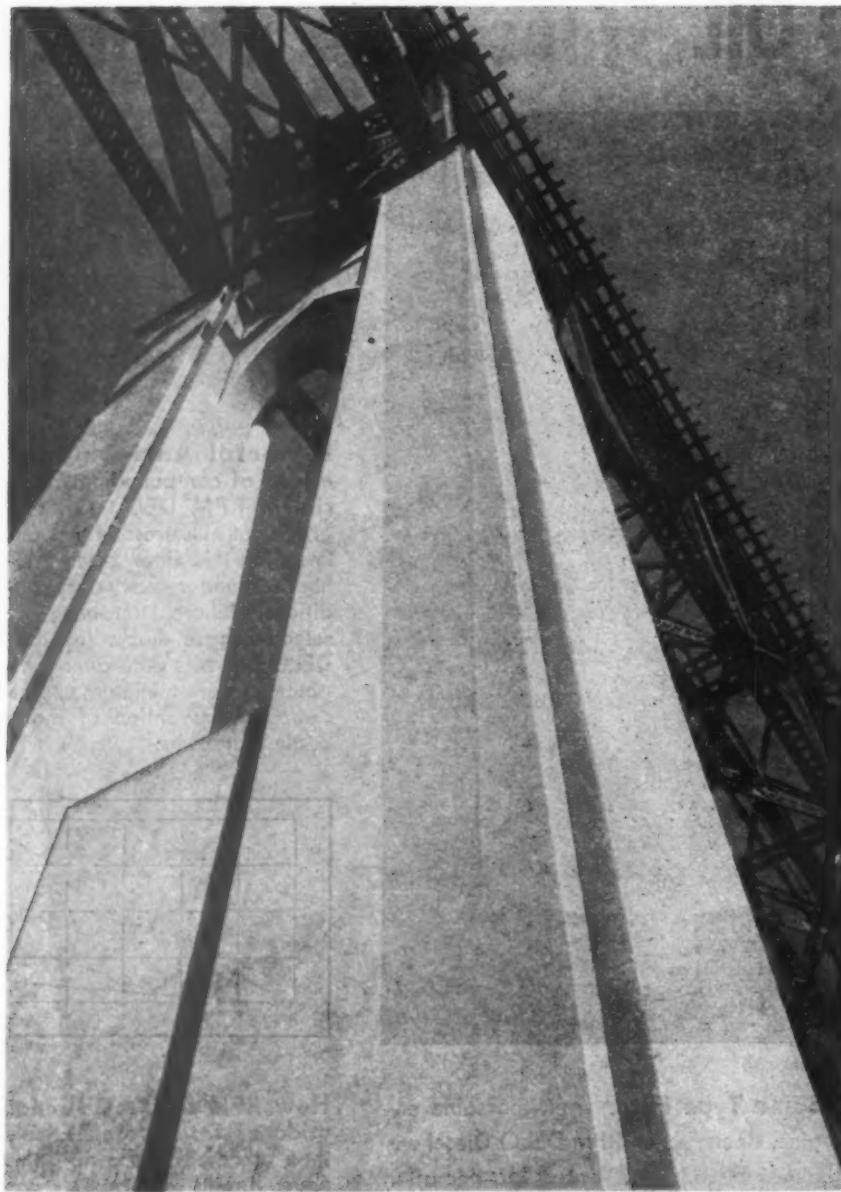
How RPM DELO Oil resists oxidation far more effectively than other oils is shown in this chart. Results were based upon increase of viscosity during severe laboratory tests. Write Dept. T-X, Standard of California, San Francisco 20, Calif., for more technical information on RPM DELO Diesel Engine Lubricating Oil.



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The 196-ft. concrete shafts of the taller pier — pleasing architecturally as well as structurally, worked after extensive study

companying photos, was assembled entirely from structural members later used in the bridge.

All structural steel, totaling 4,500,000 lb., was hauled over the highway 30 miles from Lexington. The heaviest unit weighed about 40 tons, and the maximum length involved was 65 ft. The Lexington Trucking Company handled this job without difficulty, using trailer trucks and single or dual axle "mules" under the rear end of the load. Steel was unloaded and handled at the site by a gasoline engine operated stiffleg with a 75-ft. boom. This same boom loaded steel on a narrow-gauge rail car for delivery out to the traveler with a gasoline locomotive.

Rivet boxes filled with bolts or other hardware were used at the di-

rection of the engineer to carefully counterbalance the temporary cantilever stresses set up by the traveler and the dead weight during certain phases of the erection. Such weighting was used on the top-chord-connected 192-ft. span.

Deflection under dead weight of the cantilevered members was a problem. When cantilevering reached an erection bent (at L-6 and L-14) or a permanent pier, the steel was lower than the top of the bent or pier. The cantilevered structure was raised in each instance by forcing it upward by means of a hydraulic jack under each truss. A raise of as much as 32 in. was required at one point.

The bridge is cambered for dead load only, using 3.6 in. as the maximum calculated deflection at midpoint

of the 448-ft.-center span. The maximum live load deflection is expected to be about 1.3 in.

Interesting Design Problem

The 3-span continuous system, totaling 1,088 ft. in length, was an interesting problem in stress determination. Four trial design stages were required. For the preliminary design the assumption of a beam with constant moment of inertia was used. Main dimensions were assumed and the dead and live load stresses calculated. The assumed sizes and weights of members were revised in the second trial, and elastic curves drawn and stresses computed. These stresses did not check within the limits required by the specifications, so new elastic curves were made and a third design completed. The fourth and final design was based on computed dead weights of the steel as actually detailed.

Member sizes had to be increased to meet erection stresses only at the $\frac{1}{4}$ points of the continuous spans, where moments change from positive to negative.

Loads to Be Checked with Jacks

The state highway department, in view of the exceptional size of this structure, included a clause in the contract requiring the contractor to weigh the dead loads on the main piers after completion. This double-check on the computed design stresses will be made with hydraulic jacks under the close supervision of the department's bridge design staff.

The Clay's Ferry bridge was designed by the Kentucky state department of highways bridge staff, H. R. Creal, bridge engineer, and E. D. Smith, ass't bridge engineer, and the information in this article, including drawing and photographs, was furnished by them. T. Stephen Watkins is commissioner of highways; and Thomas H. Cutler, state highway engineer. Mack Galbreath, district engineer, represents the Public Roads Administration, which is supplying one-half of the project cost.

Substructure contractor: Massman Construction Co., Kansas City (\$345,800); Superstructure: Mount Vernon Bridge Co., Mt. Vernon, O., Walter Smith in charge and L. P. Lambräu, engineer (\$465,000 for steel, fabrication and erection); concrete deck and handrail: R. R. Dawson Construction Co., H. D. Strunk in charge (\$166,000). The total cost of this Federal-aid project is about \$976,800 or approximately \$21 per sq. ft. of roadway.



They certainly have snow in Clinton County as shown by this cut through a drift

Snow Plowing Problems in Clinton County, New York

How county is organized; comments on last winter's record snow; thoughts on equipment types and use of snow fence

CLINTON COUNTY, located in the northeastern corner of New York State, in the foothills of the Adirondacks, last winter experienced the most severe winter to maintain traffic since snow removal became universal here, in 1930.

The County has an area of 925 square miles; the surface is generally hilly and broken in the southwestern part of the County, but levels out easterly to Lake Champlain and northerly to the Canadian Border. It had in the 1940 census a population of 54,006 and is for the most part a rural county with dairy products, pulp wood, apples and potatoes, the principal produce.

There are 1,444 miles of road in Clinton County, exclusive of the City of Plattsburg and incorporated villages, of which 224 miles are State Road; 294 miles are County Highways; and 926 miles are Town Roads. Snow removal on the State Roads is the responsibility of the County; sanding is handled by the State Highway Department. Snow removal on

By JOHN J. COFFEY
County Superintendent of Highways
Plattsburg, N. Y.

the County and Town Roads is the responsibility of the Towns.

On the 224 miles of State Roads in this County, 172 miles are opened by the County, with its own equipment; the remaining 52 miles are opened by the Towns on a per-mile basis. However, the County erects all of its snow fence, which totals 47 miles, and of which 38 miles is 4-ft. and 7 miles is 6-ft. picket fence; and 2 miles is collapsible railroad-type fence.

County snow removal equipment consists of 5 heavy trucks, (5-7 tons), equipped with V-type plows; 3 medium trucks (3-4 tons), with V-type and straight blade plows; 3 light trucks (2 tons) with straight blade plows; and 1 rotary plow. All plows and wings are full hydraulic.

The County for snow removal purposes is divided into four districts and in each district is placed the snow

removal equipment best suited for the location.

In district No. 1, is located the main County storehouse and shop which serves to some extent as a headquarters for the other three districts. Here all telephone calls reporting highway conditions are received and all orders go out. Minor mechanical repairs are made in the respective districts; all other repairs are made at this main shop. In case of a breakdown, the usual procedure is to order the equipment into the shop and issue a similar piece of equipment to the district superintendent while repairs are being made.

It is in the northwestern part of the County that snow conditions are really tough. It is not so much the snowfall as the wind that gives the trouble. This section of the County is a miniature plateau, rising to 700 ft. above sea level. Crossing this plateau is the divide line between the St. Lawrence River Valley at the north and the Lake Champlain Valley at the east. Maybe a meteor-



Drifts 11 ft. or more high are not uncommon in Clinton County. These pictures were taken in town of Ellenburg

ologist could explain the severe and almost constant winds that affect this area. Certainly there must be an explanation because there is hardly a day when there is snow on the ground that the road does not need plowing.

The most violent storm in years hit this north country January 24, and it was not until February 2 that the storm had subsided enough to warrant sending snow removal equipment into some sections of the County. On February 8 the last miles of State Road were opened. One Village, Churubusco, was completely closed in for 12 days. By a month after the storm, only half of the County Roads had been opened in the northern part of the County and only 20% of the Town Roads. There was no

chance of their being opened until the sun helped.

Towns Couldn't Wing the Banks

The County and Town Roads were much more difficult to open now than the State Roads because the Towns, with their large road mileages, did not have sufficient equipment to keep the banks combed down. With drifts measuring 11 ft. or more, and snow hard enough to hold a team of horses, no town with a small valuation can afford to have enough snow removal equipment to give regular service. The Towns of this County have some of the most modern 4-wheel-drive trucks, but in drifts of the nature above described little progress was made for weeks.

Widening roadway through drift



In early storms and light snowfalls our light and medium sized trucks, equipped with one way plows, are used. They are light enough to be economical to operate, yet fast enough to give a good account of themselves. However, as the winter goes along, and the banks become higher and harder, the usefulness of light trucks diminishes and our heavy trucks are put into use.

We have been successful with the conventional 2-wheel-drive truck because all of the roads opened by the County are wide State Roads, with few grades in excess of 5%. These trucks are faster, and because of this, I believe they can hit a bank fully as hard as a 4-wheel-drive truck of equal size. However, I am just citing ideal conditions. If the roads were narrow or winding where the probability of getting into the ditch were greater, or where the grade were steep, I would prefer a 4-wheel-drive truck!

Rotary Was Indispensable

Our one Rotary snow plow is four years old and is giving excellent service. In the first 15 days of February, it was in use 299 hours. It was used almost entirely as a widener throughout the winter. It was only by blowing the banks away with the blower, or combing them down with our trucks' wings, that we were able to open up in a reasonable time after the last storm. One of our Towns, the Town of Ellenburg, has recently purchased a Rotary snow plow which is a different type from the one owned by the County. The outstanding feature of this machine is the moveability of the shaft to which the paddles are attached. In deep snow, where the banks are hard, this shaft can be moved hydraulically to a height of 8 ft. to break down the snow.

With a west wind prevailing in this County, the banks of snow on the west side of the north and south roads became very high this season, with

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**Use the
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2 WAYS!**

Here's a point to remember when you decide it's time to change to winter-grade oil.

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and dispersive qualities . . . cleanses and washes away carbon and other harmful products of combustion. Its anti-oxidant action guards against the formation of varnish and sludge deposits on vital parts.

AMALIE H-D gets its *greater oiliness* from a special refining process which preserves the natural lubricating qualities of selected Pennsylvania crude. For winter — use AMALIE H-D Sub-Zero.

Ask your AMALIE Distributor, or write Dept. C9.



little snow on the east side of the road. A blower could have remedied the situation but even with it working 20 hours per day it still wasn't able to get on all roads.

Welded Cutting Edge on One-Way Plow

As a substitute we welded a cutting edge to the front of one of our one-way plows, the cutting edge extending back from the nose of the plow toward the truck and making an angle of about 75° with the horizontal. Driving in a northerly direction we would bite into the bank on the west side of the road taking a surprisingly large slice of snow. This truck was followed by another that moved the snow farther to the east side of the road. In the ideal conditions above described real progress can be made by this method.

We have found it best to get our snow removal machinery out very soon after a storm starts, say, when two or three inches of snow has fallen. Light, fast, trucks, equipped with straight blade plows are most efficient when the storm first starts. It is our policy to stay with the storm just as long as vision is such that the safety of the traveling public and the operators is not imperiled.

The five year average for snow removal costs on State Roads, prior to the past season, was \$122 per mile. Expenditures for the past winter totaled \$36,897.35, or \$164.72 per mile. So great was the cost of snow removal last season, the State enacted legislation making available five million dollars to compensate the various municipalities of New York State for extraordinary expenses incurred.

Foresees Big Progress After the War

With the end of the War and when supplies and equipment become available again a vast improvement can be made in snow removal here. The 48-in. picket snow fence should in my opinion no longer be used. There was a day when any barrier that obstructed snow was worthwhile but with the advent of faster and more powerful trucks that axiom no longer holds true. For the control of snow, it is my belief that we should erect the collapsible Railroad type fence, 6-ft. picket fence, or no snow fence at all, the only exception being about 6 miles of exposed highway in various sections of Clinton County, for which the only remedy is the planting of trees. I believe it would be wise for the County to purchase a strip of land, say 200 ft. wide, on the side of the prevailing wind or probably in some places on both sides, and planting this land to trees of some fir species, say, dutch pine, which thrives

well here.

With the reforestation above mentioned, 2 more blowers, less snow fence but higher fence, and a sufficient number of fast medium sized trucks, snow removal would not only be well handled but would be economically handled.

Dallas, Tex., Has \$146,000,000 Master Plan.—Citizens of Dallas, Tex., will vote this fall on \$20,000,000 bond issue to finance the beginning of work on a 25-year master plan, which calls for an ultimate expenditure of \$146,000,000 by 1970.

Inequitable Wages

By HALBERT P. GILLETTE

UNLESS the reader has studied data recently published by the Bureau of Labor Statistics he is in for some startling surprises. We have been told repeatedly that had it not been for federal control of wages and prices an enormous inflation would have occurred in both, comparable to the inflation in the first World War that ended in 1918. So when you learn that weekly wages in factories and prices of farm products rose about the same percentages during the war just ended as during the one that ended 27 years ago, you are apt to be somewhat shocked.

During and following that earlier World War no attempt was made by our government to control either wages or prices. Between 1914 and 1919 average weekly wages in American factories rose 107%. Between 1939 and 1945 they rose 109%. Bituminous coal miners fared even better for the weekly wages increased 125% between 1939 and 1945. During World War No. 1 the average wholesale price of farm products rose 124% as compared with 112% during the war just ended. The wholesale average price of grains rose 153%, and that of cotton 135% in this war, both rises being comparable with those during the earlier war.

In the highly unionized trades, strikes and threats of strikes were used to force wages higher and ever higher. When it became evident that federal bureaucrats were not holding wages down as they were supposed to do, an exodus of farm workers to the factories began. To prevent greater abandonment of farms, wages of farmers had to be increased; that, of course, forced a corresponding increase in wholesale prices of farm products.

Although the Bureau of Labor Statistics has been diligent enough in publishing wage data relative to factory workers, it has published little

as to the income of "white-collar" employees. Fortunately, however, it has published "indexes" of numbers of employees and payrolls in the "retail trade," from which I deduce that such employees were getting only 34% higher weekly wages in March, 1945, than they averaged in 1939. It is safe to infer that stenographers, clerks, teachers, policemen and the multitude of other white-collar workers did not average as much as 30% increase in their salaries, or barely enough to cover their increased living expenses. Compare the 34% weekly wage and salary increase of employees in retail stores with the 109% increase in factory weekly wages, if you want to see how inequitable government control of wages and salaries has been.

Of course, the War Labor Board has had no control over wages paid to soldiers and sailors. I have no doubt that when they return to civil life, some 11 million strong, Congressmen will hear enough from them as to bureaucratic control of civilian wages.

The payment of time-and-a-half for hours worked in excess of 40 hours a week added about 8% to the average hourly wage of factory employees. The weekly average was \$47.50 in March, 1945. Since it included payment to many relatively unskilled women, it follows that skilled mechanics earned far greater sums.

Bureaucratic control of wages during the war has been very unfair to the majority of employees. If, in the effort to control prices after the war, wages are held down, the effect is likely to be not only unfair but a deterrent to the revival of normal business. In fact, it is an economic incongruity to rule (as has just been ruled) that wages will be allowed to rise only where it can be shown that prices will not rise in consequence.

NEW EXPRESSWAYS FOR HARTFORD



Air view of downtown Hartford showing proposed new downtown terminal facilities (see also Fig. 8)

A case study of wide interest to engineers with urban problems. Four projects to cost \$21,700,000 recommended by Connecticut state highway department, after comprehensive traffic studies.

HARTFORD has joined the growing list of medium-large cities now being measured for modern express highways. Facilities to speed traffic between its congested downtown area and outlying suburbs are recommended in a recent report by state highway engineers.

This latest proposal includes four projects as shown in Fig. 1, planned to tie into and supplement the existing U. S. 5 and 5-A expressways north and south of the city, and other expressways previously planned and slated for immediate postwar construction. Fig. 1 shows the relationship of the four proposed new projects to the existing and previously planned expressways.

The serious condition of the older

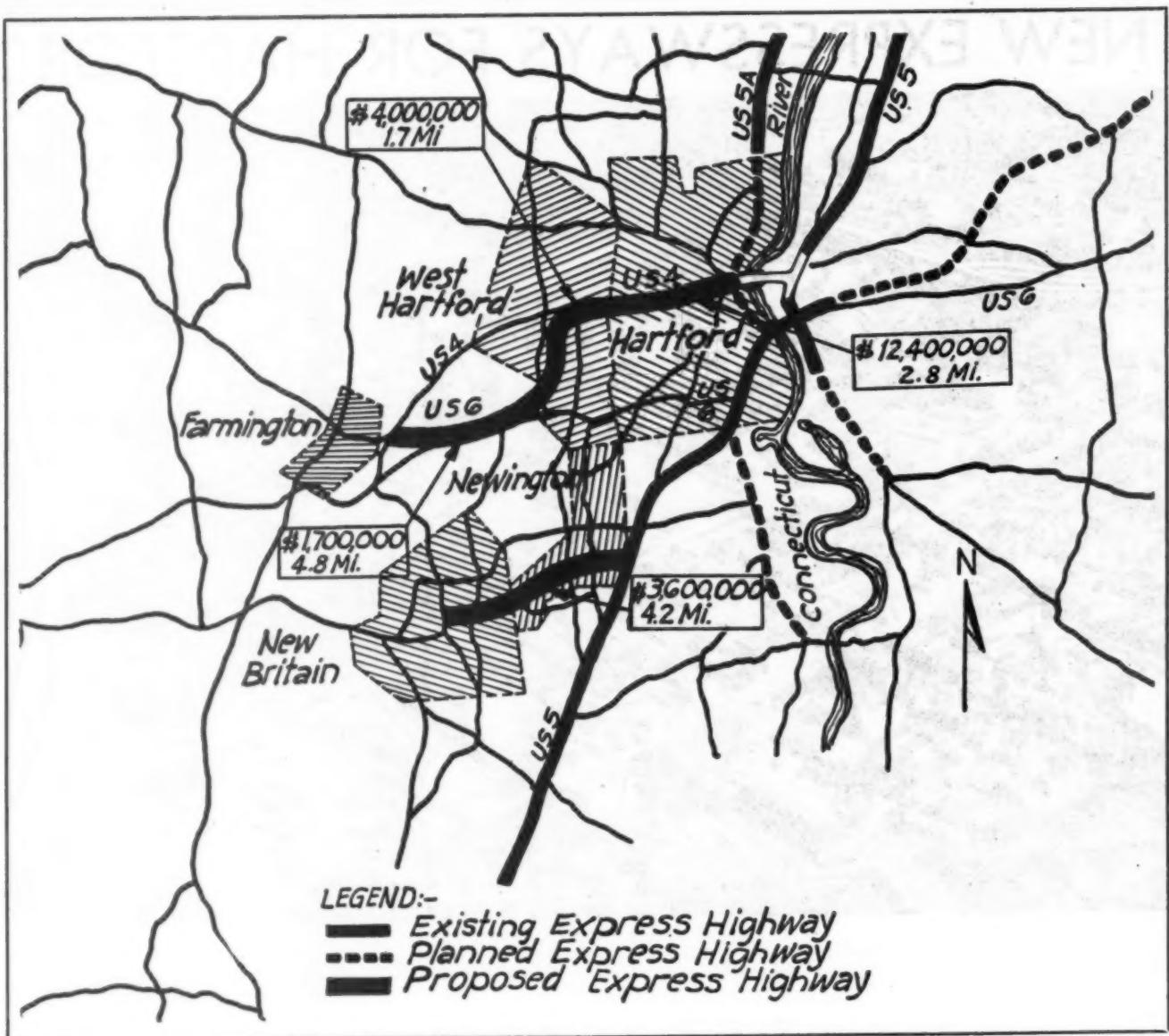
cities of the east, of which Hartford is one, has been pointed out repeatedly to highway and city planning authorities. The decentralization of business to outlying districts which are accessible, the inevitable falling of central property values, the decadent areas near the centers of cities, and the consequently higher tax rates are matters of no small concern, if these cities are to survive. The situation is approaching the time, not of what *can* be done, but, of what *must* be done!

The first consideration in any metropolitan planning program should be that of achieving relief from the intolerable traffic congestion.

In the past the Connecticut state highway department has undertaken

very few highway improvements aimed at the relief of city traffic congestion. The same situation has existed in almost every state in the nation. It is now recognized, however, that the congestion on the principal city streets is more than a local problem—that its proper solution is essential to the welfare of the State as well as of the cities. With most of the highway traffic in Connecticut either originating in or destined to the cities, *fully efficient highway transportation can be obtained only when adequate extensions of our state routes are provided into the cities.*

The postwar period will see the initiation, in cooperation with the cities and towns, of a new phase of Fed-



eral-State highway construction aimed at the logical extension of these inter-city routes into and

through the congested urban centers.

Relief to the critical urban condition is no less difficult of solution

than it is serious. It is with full cognizance of the magnitude of the problem and its importance to the individual cities and towns that a study of the highway needs and the development of an expressway plan for the Hartford Metropolitan Area have been undertaken by the state highway department.

Acknowledgment is made of the assistance of local authorities, of Mayor Mortensen of Hartford, of Mayor Quigley of New Britain and particularly of Hartford City Engineer Robert J. Ross and members of his department and of the Hartford flood control and improvement commission. The ideas of these officials and the plans developed by them over the years constitute in large part the basis for the highway facilities proposed in this report. Acknowledgment is made, too, of the fine work being done by the planning commissions and other local authori-



Fig. 1—Showing the proposed new expressways in relation to existing streets and railways (see plan view, Fig. 8)

ties in the development of realistic plans for off-street parking.

Summary and Conclusions

The department's work on the Hartford project has included a comprehensive analysis of existing highway facilities, of present and future traffic densities, of traffic origins and destinations, of traffic benefits and of the estimated cost of alternate improvements in the Hartford Metropolitan area. Conclusions of a basic nature, applicable to all similar urban congestion problems:

1. Distribution facilities in Hartford and its largest and closest suburbs must extend into the central areas in order to serve effectively the great bulk of traffic destined to those areas.

2. Expressways and distribution facilities should be adequate, or provide flexibility in the design, to accommodate a 100% increase of estimated 1940 traffic flow.

3. The development of adequate parking terminals and the development of express highways leading into cities are each a part of the same traffic congestion problem and are inseparable. Either improvement without the other cannot provide a wholly satisfactory solution to this critical urban traffic problem.

4. The development of the proposed expressways, which is essential if traffic is to move and not to stall, will provide far reaching benefits. The motorists will travel in and through our cities with a freedom and degree of safety heretofore impossible. Great community and business benefits will result from improved traffic conditions.

Conclusions with special reference to the Hartford situation (see illustrations) include the following:

5. The modern highway improvements which are in use together with those which are scheduled for completion in the immediate postwar period will provide a modern integrated express highway system into Hartford from three directions: north, east and south.

6. Routes entering Hartford from the west and southwest, all 2-lane surface streets, carry some of the heaviest traffic loads which enter the city.

7. Traffic from West Hartford, the greatest individual source of traffic to Hartford, should be served directly by an expressway.

8. Traffic from Route 4 and present U. S. 6 should ultimately be served by a continuation of the Hartford-West Hartford expressway

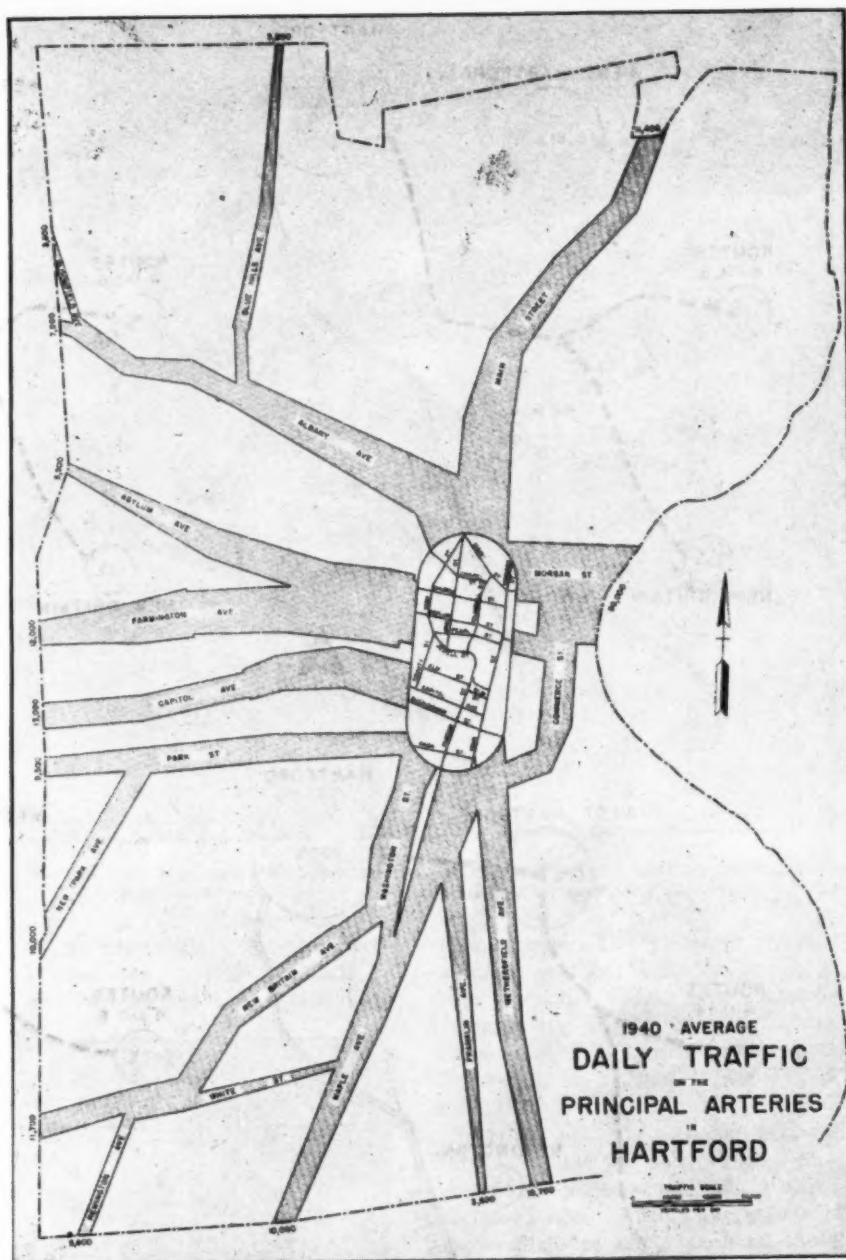


Fig. 2—Daily traffic on principal arteries in Hartford (1940 average). Widest lines represent approximately 40,000 vehicles daily

southwesterly from West Hartford center to Corbin Corner.

9. Traffic from Hartford to New Britain should be served by an expressway easterly from New Britain to U. S. Route 5 in Newington.

10. Priority section 1 in Hartford, the improvement from Bulkeley Bridge and the Hudson Street traffic circle westerly to Sisson avenue, and priority section 2, the improvement from Main street in New Britain easterly to U. S. Route 5 in Newington, are the most urgently needed improvements in the area.

Highlight Details of Study and Report

The Hartford study was under-

taken to provide a basis for:

(1) The determination of the location and character of major highway improvements that are needed to complete the system of express highways in the metropolitan area of Hartford, and

(2) The selection of those sections of the above improvements which are most urgently needed in order that the making of surveys and the drawing of plans may proceed in a logical and well integrated manner.

Vital Need for Expressways

It has been clearly demonstrated by expressway improvements now in service that they represent the only real solution of the problem of high-

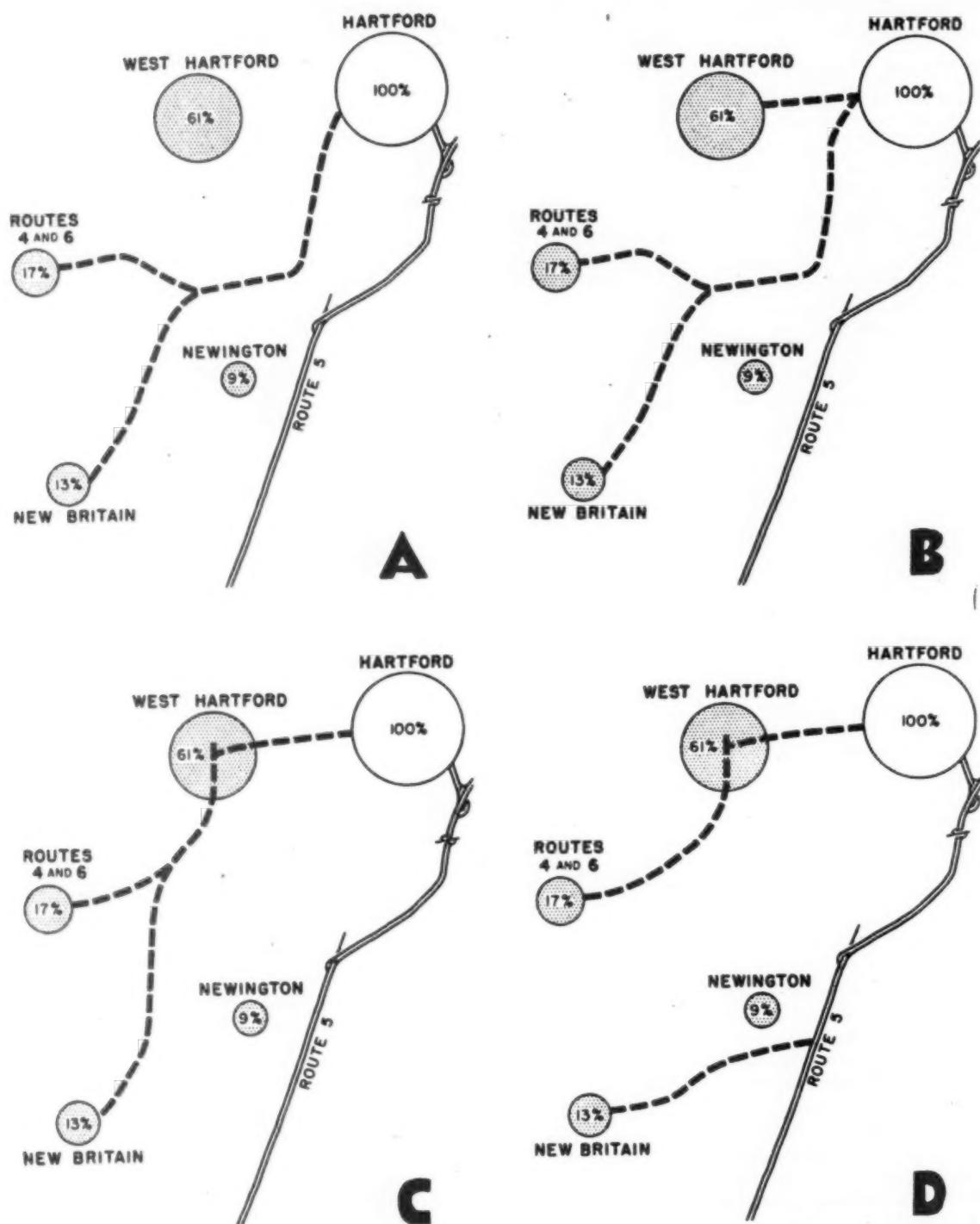


Fig. 3—The fourth of these alternate route schemes was finally recommended—see text

way congestion. Piecemeal reconstructions such as widening or realignment of existing streets, channelization of traffic both at and between intersections, traffic signal controls, etc., may all improve existing conditions but they provide no panacea for the hazards and inefficiencies of our existing heavily traveled highways and streets. These highways and streets become effective arterials, truly consistent with the high state of development of the mo-

tor vehicles that use them, only when they permit the free and continuous flow of traffic. Toward this end the modern expressways have been developed.

What are the important characteristics of these facilities?

Expressways of the highest order of development are characterized by

(1) Restrictions of access to established entrances and exits,

(2) Physical separation of opposing traffic movements, and

(3) Elimination of cross traffic by construction of overpasses or underpasses, or by closing of minor streets.

The control of access to an expressway is probably its most important distinguishing characteristic, the one which will do most to prevent obsolescence of the highway and, of equal importance, prevent an undesirable road-bordering growth to our cities. There are examples throughout the country of roads built through open country adjacent to a

city but almost immediately creating a mushroom development strung out into the previously undeveloped area. The road no longer provides the same character of service to the traffic for which it was built. The mushroom development is inconsistent with sound land use and with the character of expansion our cities need.

The other major characteristics of expressways, i. e., separation of opposing traffic movements on the facility and elimination of cross traffic, are essential to the provision of highways with the maximum capacity, and the minimum delay and hazard.

In general, expressways will be built on new locations. They will utilize undeveloped property insofar as is consistent with the traffic service for which they are built. Except in areas of intensive property development, wide rights of way are needed to permit the gentle slopes and landscape development which are desirable. Properly planned and constructed expressways, utilizing, as they will, some of the present rundown and decadent areas, should not only give greatly increased efficiency to highway transportation but also provide a parklike development throughout the greater portion of their length.

In contrast to the numerous expressways constructed or definitely planned to the north, east and south

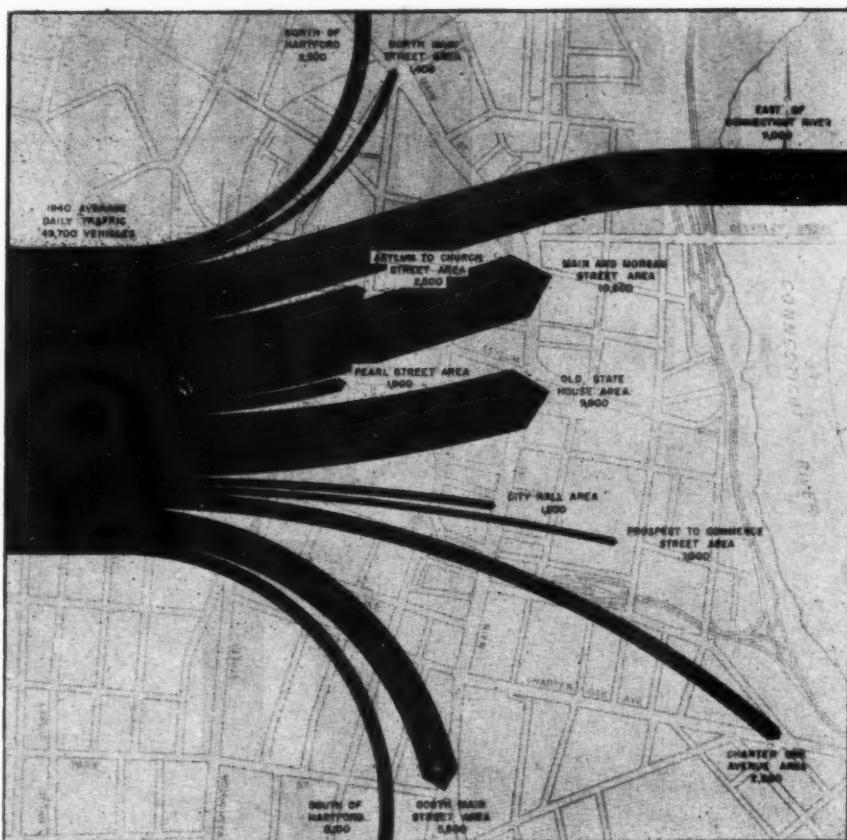


Fig. 4—Visualization of traffic from the west into downtown Hartford, showing fanning out of the 49,700 daily vehicles that could be expected on a westerly expressway

of Hartford, traffic entering Hartford from the west is confined to several heavily traveled 2-lane sur-

face streets. The principal western arteries serving Hartford are Asylum Avenue, Farmington Avenue (Route 4), Capitol Avenue, Park Street and New Park Avenue which carried 5,500, 12,000, 13,000, 9,500 and 10,000 vehicles a day, respectively, at the Hartford—West Hartford town line in 1940. Prewar congestion extended from the central Hartford area westerly for a considerable distance along each of these arteries. A return to normal traffic conditions with even a moderate traffic growth will not only increase the degree of this congestion but will produce congestion over greater distances of these same arteries. A graphic picture of these 1940 average daily traffic flows is shown on Fig. 2, a traffic flow map.

In total there are on the streets and highways at the city line 11,400 daily vehicles in the north, 50,000 crossing the Connecticut River to the

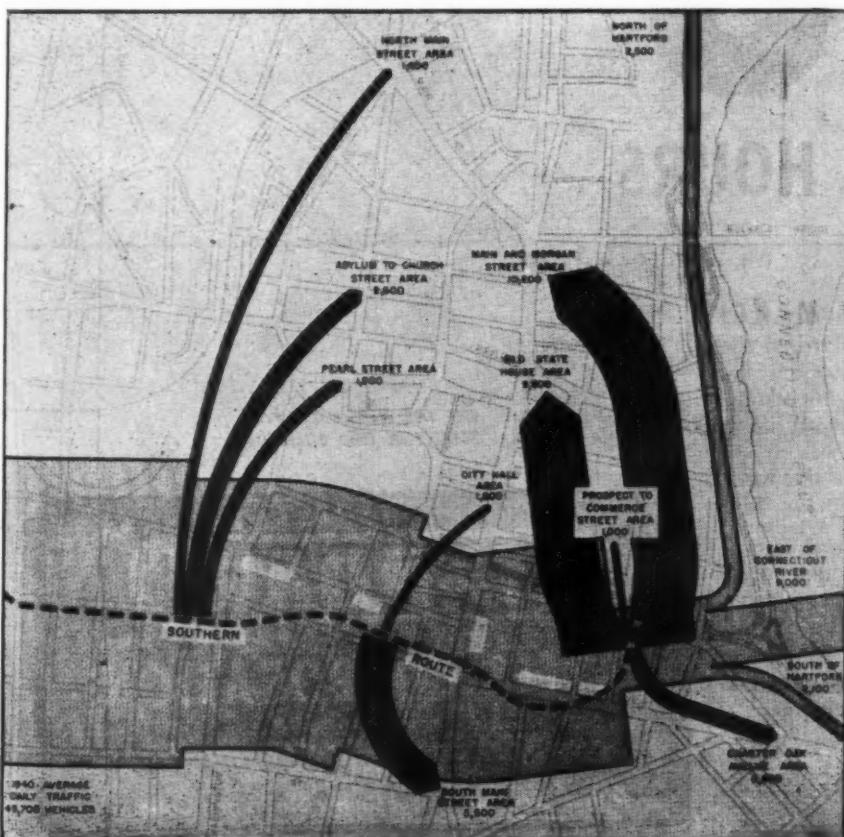


Fig. 5—One of three route proposals for terminal of expressway from the west. Black lines visualize travel necessary under existing streets beyond end of expressway (width of black line represents volume). This proposed route did not properly relieve congestion within the business district as shown by the two heaviest solid bands

12,000

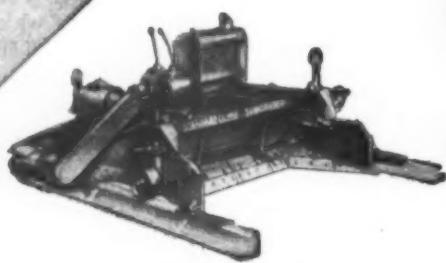
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east, northeast and southeast of Hartford, and 24,200 in the south in comparison with 17,300 vehicles in the southwest, and 50,000 daily vehicles in the west on the five main arteries as shown. Obviously, the traffic arteries west and southwest from the city for which no relief has yet been provided or planned represent the most urgent traffic problem of the Hartford area.

How Proposed Solution Was Developed

Space limitations prevent a complete discussion of the detailed analysis of traffic and costs made with this study.

The initial conception of an express highway from Hartford to New Britain, as a solution to the problem of providing a more adequate highway connection between these two cities, developed several years ago. None of the existing routes was considered adaptable for improvement to a standard justified by the traffic to be served. The first proposal was to provide a new route between the cities on a fairly direct line between the city centers. Considering only the two cities it was pretty much a "natural" as it would have utilized undeveloped property for a good portion of its length. The general location of this originally conceived improvement is shown in

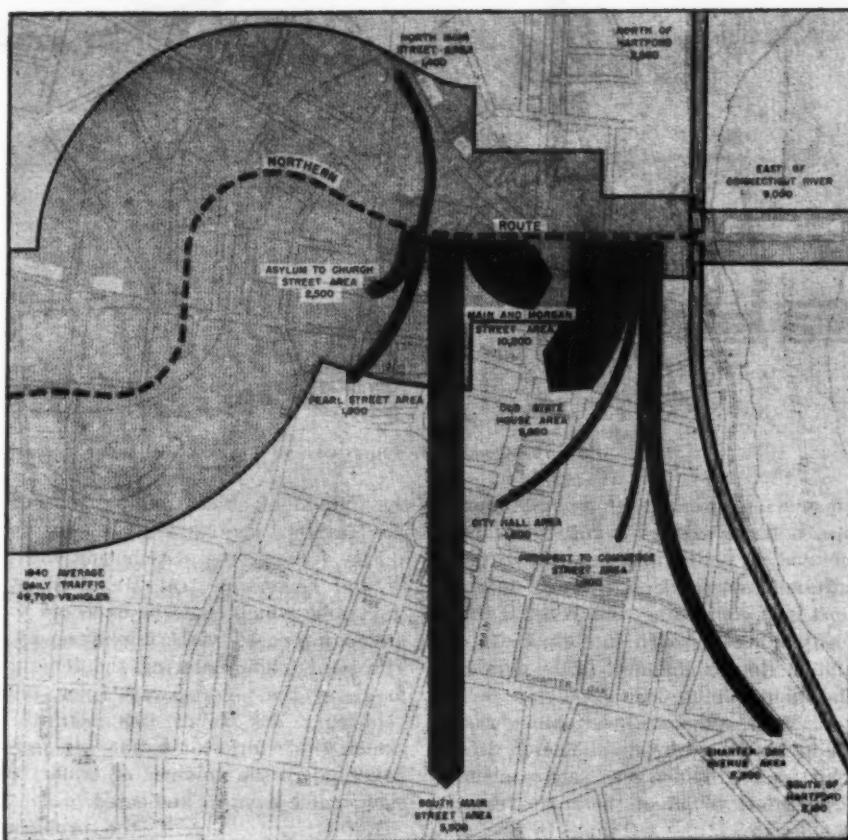


Fig. 6—Second proposal was for a single route from the west entering the north edge of the business district instead of the south. This represents some improvement under the first proposal (Fig. 5)

Sketch 3-A in relation to the major sources of traffic west and southwest

of Hartford. The area of each circle in the sketch is proportional to the traffic bound to and from each area or route shown. The total, or 100%, equals 51,200 vehicles a day as of 1940.

From the standpoint of traffic service this location provided a reasonably direct route to Hartford for traffic from New Britain (13% of total) and Routes 4 and 6 (17%). Hartford - Newington traffic (9%) would also be reasonably well served. However, as this plan did not provide service to Hartford-West Hartford traffic (61% of total) and relief to the heavily congested sections of Farmington and Capitol Avenues, a modification of the original plan was developed to provide a westerly connection to West Hartford. This is shown in Sketch 3-B.

The line in Sketch 3-B provides an excellent location as far as traffic service is concerned. However, in

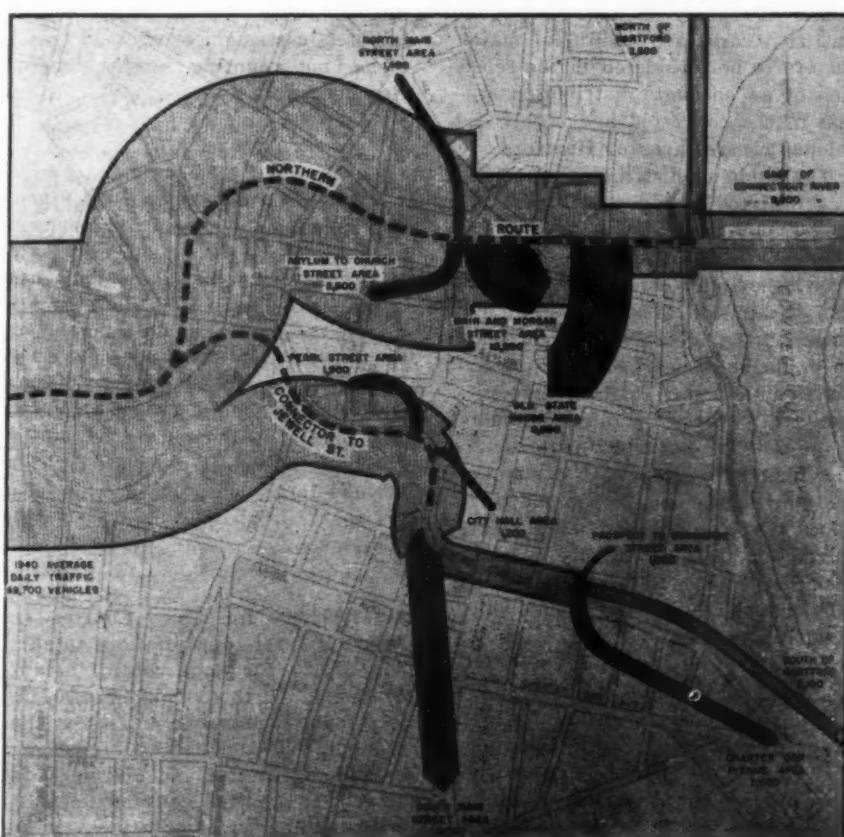


Fig. 7—Third recommended proposal—twin connectors from the west. This would further reduce travel over existing streets, as shown by shortness of heavy bands which denote large volume of such travel



Fig. 8—Combined, depressed and elevated embankment construction is proposed

considering alternatives it was found that a large saving in cost could be effected by eliminating about three miles of construction through Hartford and continuing the West Hartford connector south to New Britain and to Routes 4 and 6. This plan is shown in Sketch 3-C.

Another alternate was considered along the lines shown in Sketch 3-D. This plan provided two separate improvements to effect the same result as obtained in the 3-C plan. In Sketch 3-D it will be seen that New Britain traffic would be accommodated by an improvement east from this city to Route 5, utilizing the completed and planned expressway developments from the south for entrance to Hartford.

In comparing the C and D alternatives, it was found that the traffic service afforded and the total cost was approximately the same under both plans. However, two factors favor the "D" plan with the separate improvement from New Britain east to Route 5. Under this plan the heavy traffic flow entering Hartford on the expressway from the west would be reduced. This is a very real advantage as distribution of the heavy flow from the west in the downtown area of Hartford presents a difficult problem. The other advantage of the separate improvement to Route 5 is that part of the plan can be completed to accommodate New Britain traffic without completing the entire facility. In other words, the Sketch 3-D plan lends itself to development in stages whereas the Sketch 3-C plan does not.

The general plan illustrated in Sketch 3-D is recommended.

Alternate Distribution Plans for Downtown

Further detail of traffic origins and destinations was recorded to determine the relative importance of

the individual street intersections of the Hartford central area.

Fig. 4 shows the distribution within and beyond central Hartford of the traffic which could be expected to use the proposed western expressway. The total traffic entering the central area on the expressway is 49,700 vehicles a day as of 1940. In the sketch the widths of bands are proportional to the volumes of traffic to each traffic area as indicated.

Referring to Fig. 4, the problem is to select a route or routes which will serve as many of these areas as practical with (1) a minimum of travel over existing surface streets from the expressway to each traffic area and (2) a minimum of concentration of traffic at any one access point. Property damage and construction costs are additional major factors to be considered in the selection of an adequate distribution system in the congested and highly developed central area of Hartford.

The study of distribution facilities was initiated with the idea that the expressway need only extend to the edge of the central business area, utilizing existing streets for distribution within the area. It was found, however, that great volumes of traffic would be discharged from the expressway on the existing streets—many of which are already badly congested. The net effect of terminating the expressway at the edge of the central business area would be to make traffic conditions much worse in the very area of the city in which traffic relief is most urgently needed.

A graphical presentation, which evaluates several general plans, in so far as traffic service is concerned, is given in Figures 5, 6 and 7.

The twin connectors shown in Fig. 7 are recommended as the basic pattern for a distribution system into central Hartford. Fig. 8 shows a plan and profile of the expressways as

presently detailed.

Note that of the three proposals the twin connectors result in the least amount of detouring and out of the way travel to reach individual destinations as represented by the black arrows.

Estimate of Benefits

The total estimated cost for 9.3 miles of improvements from Hartford to Farmington, \$18,100,000, \$9,800,000 being for rights-of-way. The 4.2 mile improvement into New Britain will cost \$3,600,000, of which \$1,100,000 is right-of-way. This expenditure will bring Hartford area motorists immeasurable benefits in elimination of traffic hazards, greater comfort and convenience of travel, and a saving in time of six to ten minutes in straight theoretical travel alone, not counting serious congestion delays.

Local Governments in Good Financial Position—A great improvement in financial conditions of state and local government has taken place during the war. The Federal Reserve estimates the liquid asset holdings of these groups at \$9,200,000,000 at the end of 1944, compared with \$3,900,000,000 at the end of 1939. This condition indicates that state and local governments are in a position to undertake large scale public work programs.

\$44,000,000 for Flood Control—On July 1 Federal appropriations totaling \$44,037,000 for flood control became available. Of this amount \$30,000,000 is for flood control in the lower Mississippi, \$6,993,000 for maintenance of existing structures and \$7,044,000 for new flood control construction elsewhere in the United States.

Evolution of the Atomic Bomb

By HALBERT P. GILLETTE

ALL bombs are atomic, but only the recently invented "atomic bomb" owes its energy to the disintegration of atoms. In other bombs the released energy comes from the integration of atoms into molecules. The new bomb might better be called the uranium bomb, for its energy is due to the splitting up of uranium atoms into atoms of less weight, notably barium and helium, accompanied by the emission of electrons.

In 1815 Prout advanced the theory that all atoms are compounds of hydrogen atoms. But not until J. J. Thomson's discovery of the electron in 1897 was the greatest objection to Prout's theory overcome. Curiously enough, in the same year the Curies discovered radium whose disintegration into lead and helium goes on constantly and at such a rate as to produce a relatively enormous quantity of heat.

Two years prior to that, Becquerel had accidentally found that a uranium salt (pitchblend) constantly emitted something that affected a sensitized photographic plate. It was that discovery that inspired the research of the Curies that led to finding radium, which in turn led some scientists to re-dream the ancient dream of the alchemists, namely, that of transmuting base into precious metals, while others dreamed of much more important achievements, namely, the extraction of useful energy from certain atoms by artificially hastening their decomposition.

On August 6 of this year the public first learned that a part of this amazing dream had been realized. It was announced that the bomb that had fallen so devastatingly the previous day contained uranium, and scientists all over the world knew at once what that meant. The problem of accelerating the disintegration of uranium atoms had been solved!

In 1939 Prof. Otto Hahn described fully his discovery that barium is produced by bombardment of uranium with neutrons. Since barium atoms are much lighter than those of lead, this indicated a much greater disintegration of uranium than had been previously attained, and therefore a much greater release of atomic energy.

My investigation of uranium disintegration began in 1925 when Prof. L. D. Stamp announced that certain rocks in Burma have an age vastly less than that deduced by Rutherford's uranium-lead formula. Stamp

made this important discovery by measuring the average thickness of many annually deposited layers of sediment that subsequently became rock. These layers are technically known as varves. He found that there were about 175 varves to a foot of rock, and therefore a foot recorded 175 years. I undertook to confirm his findings, first in California, later in 12 other states and in Mexico. In the Pan-American Geologist, November 1939, I showed not only that Prof. Stamp was right, but that the older the rock, the more rapid is the disintegration of uranium into lead and helium. Hence there must be something going on in the uranium found in rock that had not been discovered in the laboratory. Whatever that "something" might be, one thing was clear, namely, that it caused acceleration of the disintegration of uranium atoms!

It is a good research rule to believe that whatever Nature does, man can eventually understand; and, understanding, can imitate. That was the principle that guided and inspired Langley and the Wright brothers in seeking to make a flying machine heavier than air. The same principle will guide and inspire scientists who seek to control the violence of the atomic bomb and thus to produce economic power by certain disintegrating minerals or their derivatives.

* * *

The foregoing was published in the Los Angeles Times, August 16. In "Newsweek," August 20, and in "Science News Letter," August 18 and 25, the scientific history leading up to the invention of the atomic bomb was given in considerable detail. But neither in those articles nor in any others that I have seen was mention made of William Prout's theory of 1815 that all atoms are compounds of hydrogen. Yet that theory is basic, and nearly 50 years ago had the approval of Sir J. J. Thomson, the discoverer of the electron.

The commonest form of uranium has an atomic weight of 238, hence it consists of 238 atoms of hydrogen. A much less common form (isotope) has an atomic weight of 235, which is one of the ingredients of the atomic bomb. Another form has an atomic weight of 239, and has been dignified by calling it a distinct atom, plutonium. This may be a premature

inference, for it may turn out to be only another isotope of uranium. However, plutonium is a part of the atomic bomb, and it is plutonium's emission of high-speed neutrons that causes such rapid disintegration of uranium 235 as to be explosive.

What are neutrons? They are uncharged particles of matter whose mass is indistinguishable from that of the hydrogen atom. Hence a neutron may be only a neutral atom of hydrogen moving with great velocity. The neutron was discovered in 1932 by James Chadwick, who since 1919 had been associated with Sir Ernest Rutherford in researches on the disintegration of atoms by bombardment with helium nuclei.

Prof. Ernest O. Lawrence, of the University of California, inventor of the cyclotron, in May, 1941, in a memorandum sent to the National Academy of Sciences, said: "If a chain reaction with unseparated isotopes is achieved, it may be allowed to proceed violently for a period of time for the express purpose of manufacturing element 94 (plutonium) in substantial amounts... If large amounts of element 94 were available it is likely that a chain reaction with fast neutrons could be produced. In such a reaction the energy would be released at an explosive rate which might be described as a 'super bomb.'"

It seems evident that to Lawrence should go the credit for having first seen definitely how to produce the atomic bomb. He was one of the 16 Nobel prize winners who collaborated in perfecting the bomb. At least two billion dollars were spent by the federal government in mining pitchblend and other uranium ores, in building and operating factories to produce atomic bombs on a large scale. Before so large a project was begun, there must have been experiments on a sufficient scale to give a high degree of confidence in ultimate success. That confidence must have steadily risen as the work progressed. I infer, therefore, that more than a year prior to June, 1944, when our troops landed in France, the scientists in charge of the atomic bomb probably were very sure that it would revolutionize warfare. If so, why did our military leaders not wait a year or longer before invading France, Germany, the Philippines and Okinawa? Were they kept in ignorance of the progress made by the scientists? Or with full knowledge of that progress, were they

(Continued on page 116)

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Snow Removal Costs in New York

THE big snow battle in upstate New York last winter set something of a record in endurance, amount of snow involved, and also in cost. Snow removal costs on the state highways, as reported by V. L. Ostrander, superintendent of operation maintenance, N. Y. department of public works, averaged \$193 per mile—as against \$87, \$117, \$93 and \$101 in the preceding four winters.

A complete tabulation of costs is presented herewith. In this table it is interesting to note that costs in the individual counties varied from less than one hundred dollars per mile in southern counties up to \$694.35 per mile in Ontario County. Erie County's costs (around Buffalo) averaged \$475.40, and Oswego County's, \$413.84,

further reflecting the 10-week period of dry, drifting snow.

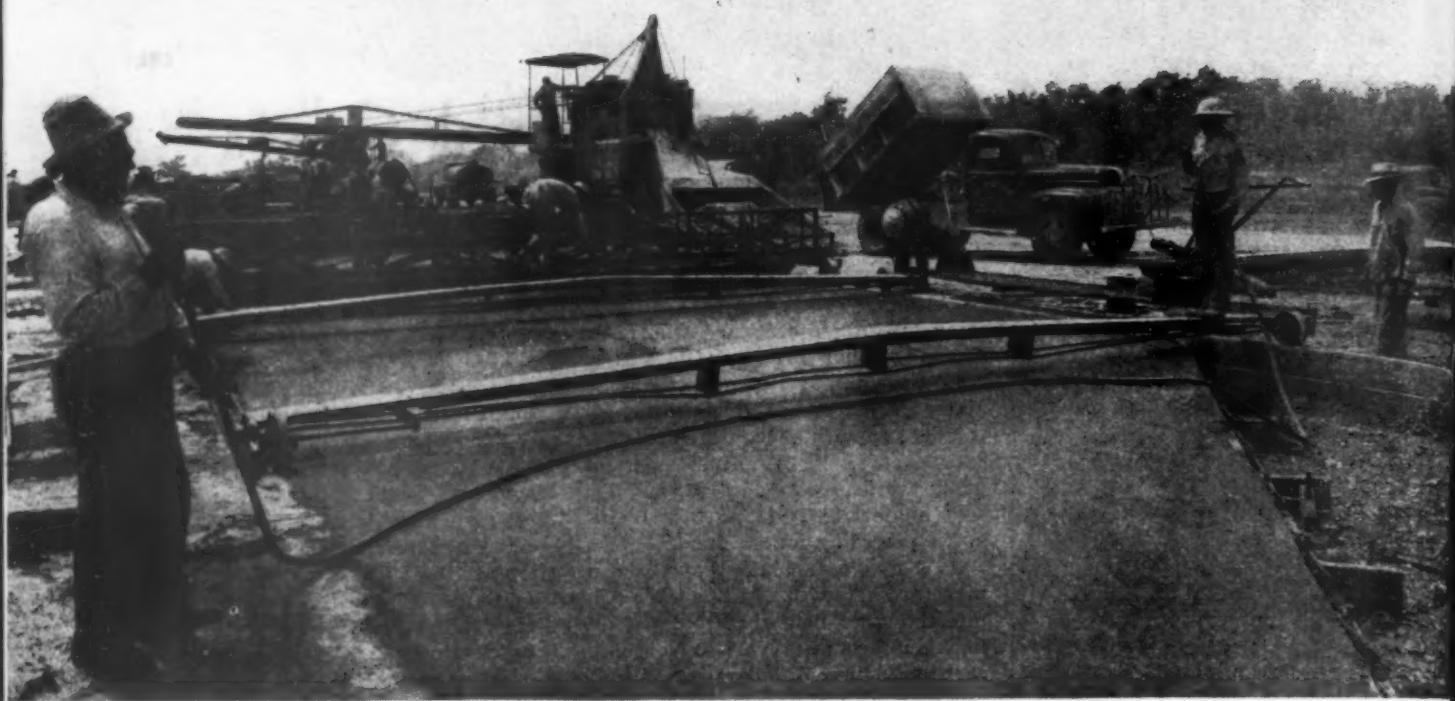
According to Mr. Ostrander, the 1944-45 figures reflect only to a degree the severity of the conditions at that time. They do not, however, convey the whole picture. It was impossible to augment their equipment or personnel to the extent necessary for adequate handling of the snow. The regular forces worked harder and longer; many roads were left blocked for greater periods than usual and the general quality of performance as to clearing of snow was not up to previous years.

The state's share of the cost, omitted from the 1944-45 column, had not been fully compiled at this writing.

Cost of Removing Snow From State Highways, Pursuant to Section 55 of the Highway Law

Counties	1940-1941			1941-1942			1942-1943			1943-1944			1944-1945		
	Cost Per Mile	Miles	Total Cost	Cost Per Mile	Cost Per Mile	Cost Per Mile									
Albany	\$152.03	\$130.99	\$121.47	\$106.30	\$244.22	\$50,856.65	\$208.24								
Allegany	55.49	42.60	50.61	29.45	228.17	19,289.29	84.54								
Broome	52.71	26.18	54.30	31.80	212.38	17,478.90	82.30								
Cattaraugus	94.05	73.78	117.24	47.50	233.90	51,956.81	222.13								
Cayuga	59.23	56.88	64.61	42.69	264.22	40,646.32	151.54								
Chautauqua	143.75	126.52	119.52	59.38	297.23	74,480.14	250.58								
Chemung	42.32	42.60	50.00	32.35	117.47	14,836.76	126.30								
Chenango	72.60	39.36	79.18	47.01	238.29	25,783.41	108.20								
Clinton	78.71	105.57	138.29	131.98	223.89	36,630.79	163.61								
Columbia	87.55	45.44	83.76	75.17	229.68	29,159.81	126.96								
Cortland	99.38	71.28	100.53	74.41	149.91	30,768.32	205.24								
Delaware	61.35	26.41	54.66	28.29	315.42	22,955.49	72.78								
Dutchess	78.28	59.11	86.00	68.59	308.26	29,350.00	95.21								
Erie	198.76	231.07	265.93	206.90	450.34	214,092.17	475.40								
Essex	73.35	69.70	83.86	93.53	274.53	27,213.50	99.13								
Franklin	76.95	69.86	136.98	74.88	257.59	45,575.56	176.93								
Fulton	94.46	44.09	89.72	93.43	133.89	18,937.62	141.44								
Genesee	115.35	184.10	152.14	78.59	165.25	59,361.52	359.22								
Greene	95.69	48.60	63.04	42.17	186.12	18,205.67	97.82								
Hamilton	92.25	80.79	127.07	123.52	152.03	40,776.60	264.23								
Herkimer	97.95	98.74	99.06	98.72	234.17	35,124.97	150.00								
Jefferson	131.69	130.85	168.21	61.43	345.77	62,073.92	179.52								
Lewis	113.93	118.13	118.73	118.13	146.97	26,665.29	181.43								
Livingston	73.32	95.20	80.84	52.05	230.23	47,746.76	207.39								
Madison	138.44	134.74	200.60	145.15	168.11	46,155.19	274.55								
Monroe	112.04	136.67	153.44	153.62	375.32	47,178.40	125.70								
Montgomery	116.21	98.78	98.78	95.48	172.10	52,317.02	303.99								
Nassau	65.77	...	...	43.20	115.14	12,413.85	107.81							
Niagara	49.34	81.42	71.26	36.79	204.60	38,368.92	187.53								
Oneida	141.69	141.77	162.77	163.11	395.84	65,004.01	164.22								
Onondaga	150.65	108.44	161.04	110.96	330.37	229,393.27	694.35								
Ontario	84.04	111.76	71.65	53.86	209.05	64,603.46	309.03								
Orange	304.87	216.53	264.21	223.64	336.46	130,714.71	388.50								
Orleans	91.26	118.83	113.24	67.52	152.75	29,397.53	185.91								
Oswego	213.59	224.77	279.33	219.23	239.97	99,310.28	413.84								
Otsego	82.72	55.56	81.26	51.33	243.64	23,036.34	94.55								
Putnam	150.21	98.84	107.97	100.00	101.16	14,716.50	145.48								
Rensselaer	112.99	190.42	130.76	132.41	252.57	37,443.55	148.25								
Rockland	69.62	30.28	64.37	54.70	105.67	9,013.00	85.29								
St. Lawrence	53.10	55.86	126.83	45.05	483.10	62,697.01	129.78								
Saratoga	116.94	87.34	128.77	98.49	216.26	32,924.81	152.25								
Schenectady	132.34	100.26	129.43	130.15	119.08	30,025.29	252.14								
Schoharie	77.77	70.72	110.80	112.50	167.24	28,735.07	171.82								
Shuyler	65.72	67.18	42.32	33.72	103.97	11,112.20	106.88								
Seneca	58.59	55.35	44.77	30.37	145.14	20,799.33	143.31								
Steuben	46.48	48.47	39.88	31.44	304.48	33,704.52	110.70								
Suffolk	193.14	...	...	66.44	254.05	52,490.50	206.59							
Sullivan	76.80	36.20	72.14	50.67	195.76	29,092.79	148.61								
Tioga	28.18	19.50	22.03	14.90	121.31	5,804.38	47.85								
Tomkins	81.85	57.52	69.41	31.28	159.90	25,290.03	158.16								
Ulster	122.51	118.63	157.00	135.40	249.55	39,076.77	156.57								
Warren	11.73	149.94	133.04	174.56	174.56	25,491.58	146.63								
Washington	42.51	32.56	75.39	68.89	220.01	15,805.26	71.83								
Wayne	64.02	78.52	72.03	51.12	166.22	28,791.07	173.21								
Westchester	54.95	28.88	67.27	43.94	311.36	24,755.85	79.51								
Wyoming	129.81	117.79	136.54	66.33	174.18	38,771.63	222.60								
Yates	53.43	61.95	38.05	42.33	109.16	17,140.15	157.03								
Totals					12,722.09	\$2,450,540.51									
Average cost per mile	101.00	93.00	105.00	114.00	...	1,537,839.23	121.00								
State cost of sanding	91.00	87.00	87.00	87.00	...	...	193.00							

Nassau and Suffolk Counties do not participate in Section 55 (snow removal).



Finishing operations for 18-in.-thick pavement. Note use of hose which was dragged along to help secure a smooth finish

Massive Slabs for Southwestern Airfield

Construction details of concrete service apron and runways for heaviest-yet design load

PAVEMENT to sustain what is believed to be the heaviest design load yet adopted by the United States Army or Navy, is now being constructed at an airfield in the Southwest. Several novel design features are being incorporated in the extra heavy duty pavement which is being constructed under supervision of the Corps of Engineers and is scheduled to be completed this summer.

First to be placed under construction on this particular project was the service apron, an odd-shaped 675 x 1,000 ft. area adjacent to an existing 6-in. concrete apron. The pavement consists of 18-in. uniform thickness concrete, placed on 12 in. of heavily rolled select material base and rolled subgrade.

Base Super-Compacted

The paving area is part in cut and part in fill, with relatively shallow grading. Base and subgrade procedures were as follows:

(1) Fill areas were brought up in the usual 6-in. lifts, the last two lifts being rolled to 100% density, as determined by the Modified AASHO Method T-99-38, using principally sheepfoot rollers weighing 650 lb. per sq. in. of lug surface.

(2) In cut areas where the existing soil failed to show a density of 100%,

excavation was taken down to six inches below the subgrade, the last six inches of material being windrowed. Using the heavy rollers, the underlying six inches of subsoil was then compacted to 100% density and the windrowed material bladed back and rolled to a similar density.

(3) A 12-in. select material base was then placed over both cut and fill areas in two equal lifts and compacted to 100% density. Base material consisted of 25% selected pit-run gravel, 15% sand, and 60% clay-gravel pit material. The first two materials were blended with the clay-gravel to lower its excessively high plastic limit.

Field tests taken for control of density requirements in many instances showed a density in excess of 100%. This was obtained by the use of sheepfoot rollers augmented by pneumatic rollers and a Super C Tournapul carrying a maximum load of 40,000 lb.

Concrete Pavement Details

The 18-in. concrete design called for placement in 25-ft. lanes, with longitudinal key construction joints. One-inch redwood expansion joints were placed every 150 ft. and $\frac{1}{4}$ x 4-in. dummy strips every 25 ft. Dummy and expansion joints were sealed with $\frac{1}{4}$ in. of hot poured sealing compound

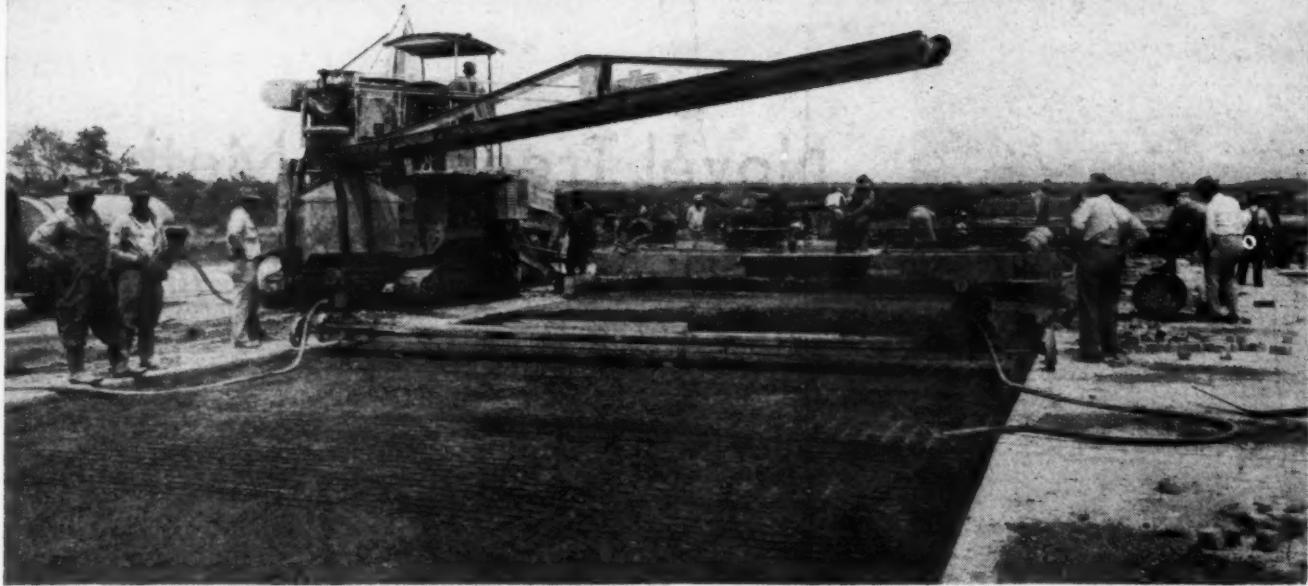
meeting Federal Specification SS-F-336.

Specially designed round dowels were spaced 12 in. on centers along transverse expansion joints. These were fitted with metal caps, painted and given a coat of hard grease, then inserted through holes in the joint boards and rested on special wire "baskets" or "chairs" which held them securely and accurately in position.

The apron slab was reinforced with $\frac{3}{4}$ x 24 $\frac{1}{2}$ ft. sections of wire mat placed three inches below the surface. Consisting of No. 000 wire spot welded at 6 x 6-in. spacing, the mats weighed 1.402 lb. per sq. ft. A bottom mat layer was also specified for outside lanes and along longitudinal parting strips in place of edge thickening. These mats were supported on precast 3-in. concrete cubes placed on the subgrade and secured with embedded wire ties.

Double Deck Forms

Forms for finishing equipment consisted of two levels of standard 9-in. steel forms. The lower sections were braced against buckling outward by welding two short lengths of forms laterally on each 10-ft. section. Seven form pins instead of four were used for each form section. This ar-



Second paver placing last 3 in. of concrete, after placement of upper mat layer. Note two vibrator units supported on portable bridge, for momentary vibration treatment at 18-in. intervals as specified.

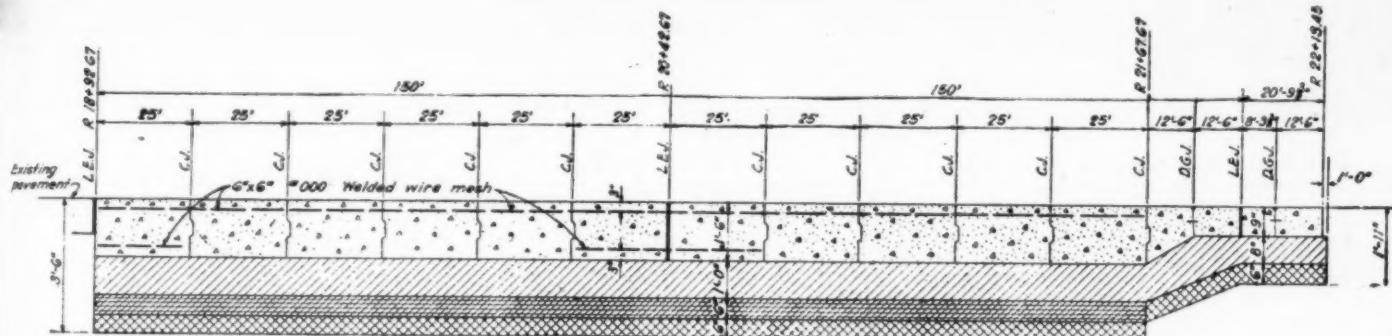


Fig. 1. Typical cross section for heavy duty service apron, which called for 42-in. combined thickness of slab and processed material.

angement had the advantage of requiring no special forms, and of involving no form wastage other than the welded-on brace lengths which could easily be burned away.

The paving scheme, no longer a novelty on paving involving mat reinforcement, consisted of dumping from a 34-E dual drum paver, striking off at three inches below the surface, placing bar mats, then immediately adding concrete for the final three inches with a 34-E single drum paver. Due to the unusual form height, it was necessary to build up adjacent unpaved lanes temporarily with about six inches of sandy material so that the paver bucket could clear the forms.

A hand-held vibrator, powered by a vibrator unit riding a bridge, was used at not exceeding 18-in. intervals for internal vibration of concrete. In practice the vibrator was inserted in every third mesh opening and held only a brief moment.

Other finishing equipment consisted of a heavy mechanical spreader, finisher, and joint machine built by the contractor to handle the $\frac{1}{4} \times 4$ -in. dummy strips.

Concrete coarse aggregate was a blend of 40% crushed stone and 60%

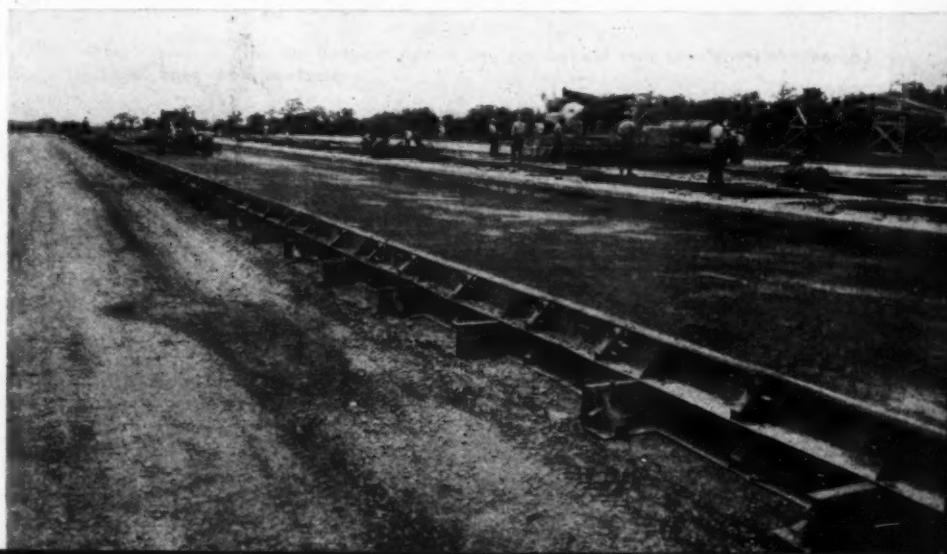
gravel, designed to economically offset the scarcity of local gravel having insufficient coarser sizes. The mix was designed to obtain concrete having an average flexural strength of not less than 700 lb. per sq. in. at the end of 28 days.

Runway Being Constructed

Work also is under way on a heavy-duty runway being built to connect with the apron. With a width of 300

ft., it is believed to be one of the widest in the United States. It will have a thickness ranging from 18 to 27 in. and the strip will provide 7,200 ft. of runway with an additional 800 to 1,000 ft. being planned. Methods used in construction are essentially those employed for the apron with the exception of the fact that steel mat reinforcing has been eliminated and outside edges of the pavement have been thickened.

How two lines of 9-in. steel forms were employed for the 18-in. slab. Short sections of form were welded on for lateral support as shown.





Compacted stabilized-soil widening in place, ready for the resurfacing crew

THE following procedure and equipment were noted on a 4-mile widening project in Darke County, Ohio, in 1944. The

Novel Trenching Method

Devised by Contractor for Stabilized Soil Widening in Ohio

contractor was Manix Bros. While reported as generally successful, the methods are not typical of those generally employed in this state. (The prevalent procedure used by Ohio contractors includes the excavating, in one operation, of a trench of sufficient width and thickness with a rotary trenching machine.)

Widening Strip, placed along an old brick pavement, consisted of compacted, stabilized soil, placed in preparation for full-width bituminous resurfacing.

Scarifying of the existing earth shoulder was done by a wheel-type rooter unit, drawn by a tractor. A single rooter tooth was used.

Trenching: First a motor grader bladed away loosened surface dirt and roughed out the trench. Then the shoulder was trenched out to exact width and depth by means of a

specially designed plow attached to one end of a bulldozer apron. The details of this plow are well shown by the accompanying photos. Note that the plow included a horizontal cutting blade and side plate which gave the trench its desired dimensions, and a diagonal rear blade or wing which diverted the loosened material laterally toward the ditch line.

The plow was raised, lowered and held in proper position by raising or lowering the dozer blade. In particularly hard ground the grader was sometimes used to give snatching assistance, by means of the chain shown.

Stabilized Material was placed in the trench with a spreader box (not pictured) of conventional construction hooked on the front of the dozer apron. The tractor pushed the box ahead. Compaction was secured by

(Continued on page 110)



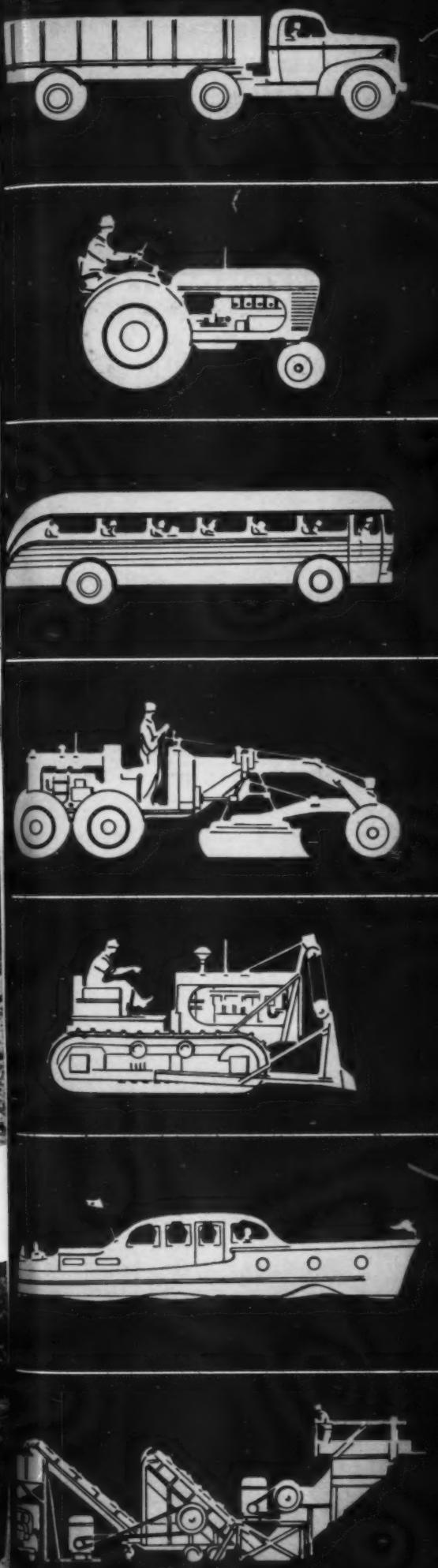
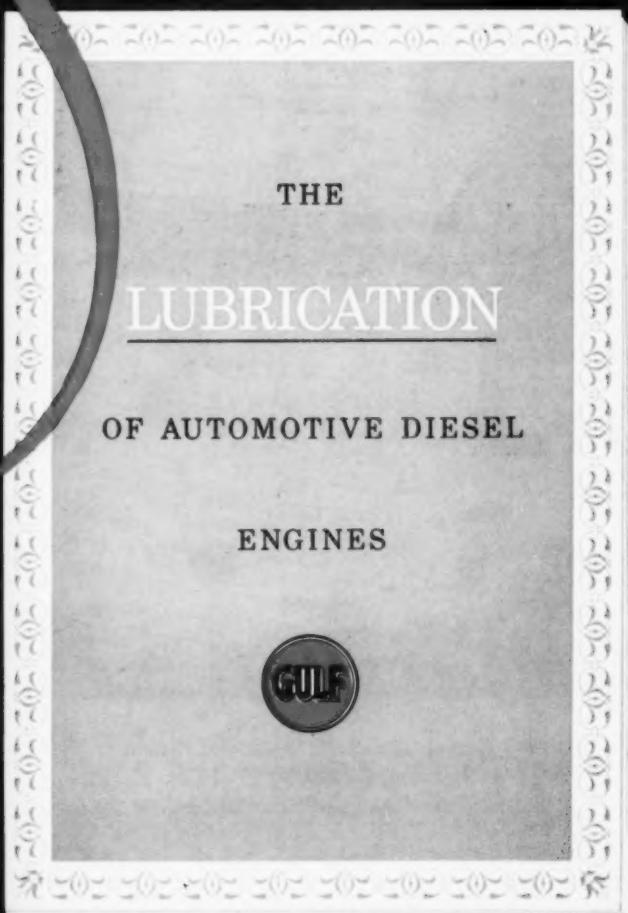
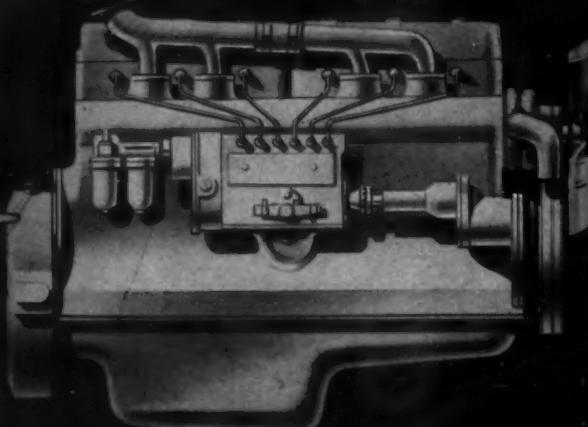
Details of plow, which included a horizontal cutting blade and spreader wing. Note chain for giving towing assistance



Loosened material was then bladed out and trench roughed out with a grader, after which a plow of special design formed trench with practically no hand labor

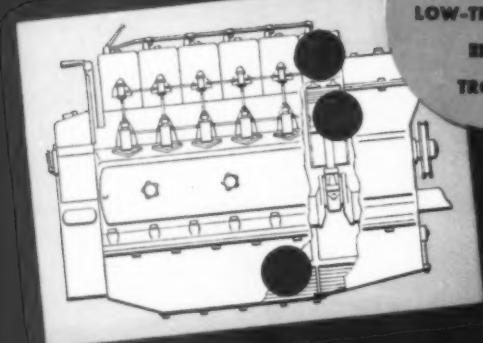
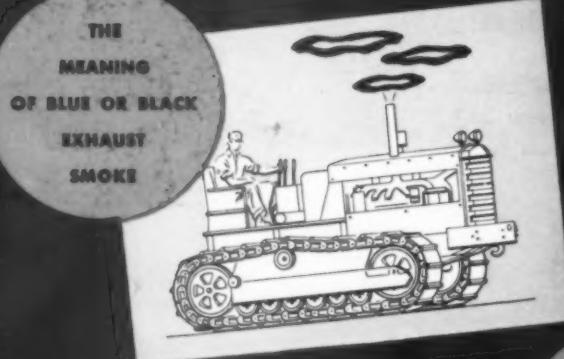
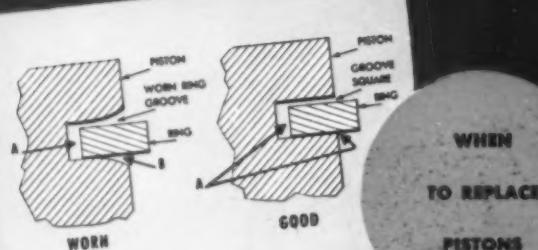


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(Continued from page 104)

passage of the tractor and hauling trucks and use of a smooth roller.

Stabilized material for the shoulders, consisting of earth, sand and water, was plant-mixed, stockpiled near the job and loaded into trucks with a power shovel. Stockpiling was done to make most expeditious use of the inadequate number of trucks available at the time.

Rooter loosening shoulder earth

New Method of Making Urban Traffic Studies

A NEW and more practical method of conducting traffic origin and destination studies in cities, as an index to the proper location and design of arterial improvements, has been developed by the Public Roads Administration with the cooperation of the Bureau of the Census, State highway departments and local planning authorities.

The new method, based upon home interviews in which the occupants of a representative number of sample dwellings are questioned in regard to all travel done on the preceding week day, is similar to the sampling technique employed in public opinion polls. It is more economical and more effective than earlier types of urban traffic studies. The method has been used successfully in 34 cities, and will be extended to other cities as post-war highway planning gains momentum.

The method, in practice, consists of selecting a certain percentage of dwellings throughout all sections of a metropolitan area for home interviews. After the dwellings are selected, the list of addresses is rigidly adhered to and substitution is not allowed. If a dwelling unit in the sample group is vacant, that fact supplies the answer, as no travel was performed by persons residing in it.

The percentage of dwellings selected for interviews varies according to the size of the city. The smaller the city, the larger the sample. In cities of about 100,000 to 300,000 population a 10 per cent sample has generally proved to be sufficient. In cities around 500,000 population a five per

cent sample is considered adequate, and in larger cities the sample consists of one address in 25 or 30 dwelling units.

If the sample is one to 10 in a zone of one-family houses, every tenth house is selected for interview, proceeding clockwise around the block. If there are apartment houses in the area, each apartment is considered a separate dwelling unit and the interviewer proceeds through the apartment house, interviewing occupants of every tenth apartment.

Questionnaire Methods

All occupants of the dwelling are questioned concerning trips made on the preceding day by automobile, bus or streetcar, the origin and destination of the trip, its purpose, the time of starting, the location and purpose of intermediate stops, and the use of parking facilities. In a survey conducted recently in Richmond, Va., the family income also was recorded, in an effort to determine to what extent economic status affects the volume of travel. Because of abnormal wartime conditions, no attempt is made to record data on week-end travel.

The sampling technique also is employed in surveys of truck and taxi movements. License numbers are selected from motor vehicle registration lists and the owners of the vehicles are interviewed in regard to trips made on the previous day, the origin and destination, the time of starting and ending the trip, and stops made en route. Truck owners are asked to state the type of commodity carried on each trip.

Since the number of truck trips usually is smaller than the number of trips made by passenger cars or public conveyances, the percentage of trucks selected from registration lists for investigation is greater than the percentage of dwellings selected for home interviews.

Accuracy Check

As a check on the accuracy of the survey and the completeness of the information obtained, certain arteries through which traffic funnels in large volume, such as bridges and important arterial routes, are chosen as control points. Traffic passing these points is counted and classified, and the results are compared with the data supplied in home interviews.

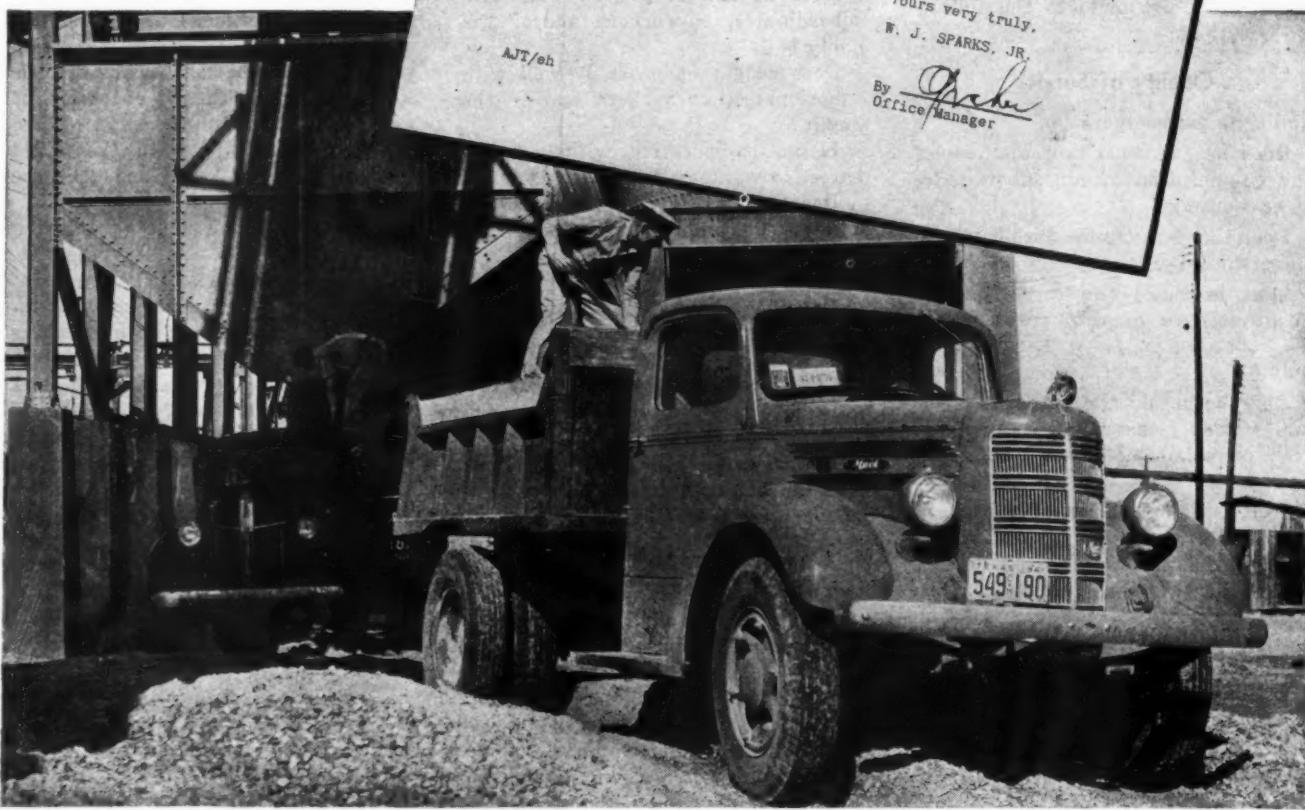
The success of the survey depends upon the ability of interviewers to elicit full and accurate information; therefore the proper training of interviewers is an important factor.

Early surveys proved that mature women are the most efficient interviewers. In surveys so far, wives of service men, school teachers on vacation and local housewives have been employed. There should be one supervisor to approximately 10 interviewers. The number of persons in a dwelling unit average about 3.3 and interviewers usually are able to complete one dwelling unit per hour.

In nearly all traffic studies conducted thus far, responsibility for the survey has been assumed by the state highway department. Immediate direction of the work is assigned to a highway planning survey division where well-trained personnel is available to organize and supervise the study. Various city agencies, as a rule, assist in the work. The Public Roads Administration has usually provided the service of one or more experienced men to aid in organizing the survey and in training interviewers.

Hard users of light trucks...

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VICTORIA, TEXAS
May 12, 1945

Mack-International Motor Truck Corporation,
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Attention: Mr. R. W. Allen, Manager

Dear Sir:-

You undoubtedly recall that in 1941 about this time you made your first call at my office. I was at that time using equipment of various makes in the $1\frac{1}{2}$ ton size. I had used these light trucks for hauling gravel and for various types of dump work for several years, and it was hard to convince me that a heavier truck could save me money and increase the efficiency of my fleet.

However, I bought one truck equipped as you recommended. Before the year ended I owned a total of thirteen Mack EFX dumpers and had more on order.

During the war these trucks have given such a good account of themselves that I wonder now why I waited so long to buy them. All of these trucks travelled in excess of 150,000 miles before engines were overhauled. They now have over 250,000 miles on them and transmissions and rear axles have not been overhauled.

The ability of these trucks to work hard and stay on the job has been the cause of me being asked to bid on many contracts which I could not have handled with ordinary trucks.

Yours very truly,
W. J. SPARKS, JR.

By John
Office Manager



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Employee Rating System Adopted by N. J. Highway Department

THE civil service commission of New Jersey recently authorized that state's highway department to put into operation an employee rating plan developed by the department workers.

The new plan is an answer to dissatisfaction with the old system of basing promotions on periodical examinations. It was found that too much depended on the result of a few hours of paper work, while other factors which make an employee valuable were neglected.

The new rating system provides a check list of points which are to be reported by the employee's superior. There are four different check lists. One is for administrative and supervisory employees, one for technical and office workers, one for laborers and one for call employees. The administrative list includes the following questions:

Quality of Service

Ability to get co-operation

Does he fail to obtain the respect and co-operation of his subordinates or co-workers?

Does he substitute authority for leadership in order to carry on?

Does he enjoy the respect and a good measure of co-operation from his subordinates, co-workers and the public?

Does he obtain the highest respect and fullest measure of co-operation from his subordinates, co-workers and the public?

Does he need too much guidance from superiors?

Does he need considerable guidance from superiors to produce passable work?

Does his system produce satisfactory quantity, quality and smooth working conditions?

Is his system so well organized and efficient that it is outstanding?

Capacity for (Intelligent) Service

Applicable knowledge

Does he ask too many non-essential questions about his work?

Does he ask only pertinent questions about his work?

Does he ask only salient questions about his work?

Is he able to advise on how to do equivalent or higher jobs?

Adaptability

Does he lack ability to do related work of equal difficulty?

Can he do one related job of equal difficulty in an acceptable manner?

Can he do more than one related job of equal difficulty in an acceptable manner?

Can he do all related jobs of equal difficulty well?

Judgment

Is he generally confused because he cannot distinguish the important from the unimportant?

Is he sometimes confused but otherwise chooses an adequate method?

Does his choice of methods make his work as well as the work of others easier?

Does he reach a sensible decision directly?

Personal Relations

Does he fail to get on well with subordinates, co-workers and/or the public?

Does he get on passably well with subordinates, co-workers and/or the public?

Is he co-operative with subordinates, co-workers, and/or the public?

Does he exert a good influence and create a fine impression upon others?

Potential Value to Service

Does he ignore opportunities to make self more useful?

Does he display an ordinary interest in the work of the department?

Is he actively interested in departmental progress?

Are his opinions on departmental affairs sought by others below and above him in the service?

Commissioner Miller's Statement

The state highway commissioner Spencer Miller, Jr., explained this plan to the department personnel in part as follows:

"Frederick W. Taylor, the father of scientific management, once observed 'that scientific management involves a revolution not only in method, but in attitude of employees toward their employers, their work and the community.' Certain it is that the effort to develop efficiency under modern employment conditions does involve a change in attitude on the part of employees and employers. This is true whether the employer is a small owner-manager, a large corporation, or a public authority."

"Since Taylor's day there have been

scores of efficiency experts who have sought to evaluate job performance. Various methods have been evolved and various rating systems installed. Some systems have been so complicated that there has been little room for the personal equation. Others have rested almost exclusively on the subjective judgment of the raters. Upon one thing there is today general agreement, namely, that any sound efficiency rating system must provide for the participation of the employees in the standards of efficiency which are established.

"A rating system must also provide a measure of flexibility; it must be adapted to the individuals to be rated and not ignore individual differences. Indeed, any plan which ignores individual differences is neither sound nor workable. An efficiency expert who was making a time and motion study of bricklayers' helpers, discovered that all of the men were pushing their wheelbarrows with their load of brick with the exception of one man who was pulling it. When the helper was asked why he pulled his wheelbarrow he replied, 'because I hate the looks of the darn thing.'

"The problem of evolving a rating system which is simple, objective, cumulative and workable has been the goal sought by efficiency experts for many years. A system which comes from the employees themselves which combines these factors is the ideal. Efficiency by consent of the employees is far more effective than by the arbitrary decision of management. There can, in fact, be no sound efficiency rating without the consent of the employees. When there is not only consent but also creative suggestions, it is a fortunate circumstance.

"The new efficiency rating system, therefore, which has been evolved within this department by an employee meets many of the most exacting tests of simplicity, objectivity and workability."

Postwar Notes

A super highway between Chicago and Detroit is being actively promoted by interested groups, including the Chicago Motor Club and the Automobile Club of Michigan. Plans under consideration call for more advanced high-speed design which would include every safety element and would cut present motoring time between the two cities in half.

Su

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Any discussion of chickens and roads today raises a profoundly serious issue.

For chickens—and all other farm products—go to the nation's dinner table over a network of farm-to-market roads which are *rapidly breaking down*. More than 50 per cent of them have no surfacing whatsoever. Rough, pitted and dangerous, they cost the farmer money, cause delays, and disrupt the nation's food distribution system.

And the problem will become even more acute as traffic increases after the war . . . unless communities begin to plan at once for road repairs and construction.

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years of successful experience in road construction, maintenance and repair. He can show you how Barrett Tarvia, with local materials and local manpower, can help solve your road problems. A friendly discussion with him can result in jobs for a lot of folks in your community at a time when jobs may be needed.

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Dragging and rolling chip course, as practiced this year in Kentucky to bring up selected traffic-bound sections of lightly traveled main roads

Traffic-Bound Roads Get a Face Lifting in Kentucky

Stage construction restricted to lightly traveled state-maintained roads. Cost to approximate \$1,500 per mile.

THE State of Kentucky has initiated a special low cost bituminous surface treatment program this year, to be applied on approximately four hundred miles of traffic-bound roads.

This low cost treatment is confined to the lighter traveled roads which are not subject to heavy truck hauling. A considerable mileage of Kentucky's 10,000 miles of state-maintained road system will meet these requirements, as one-third of this mileage is of traffic-bound construction.

The treatment is considered stage construction, as it will provide a blacktop surface on which to build future roadway betterments. Its aim is to eliminate the dust nuisance on a maximum mileage as soon as possible; also to conserve the one-half inch or more of floater course aggregate which normally is dissipated yearly by the action of traffic and other agents. A further aim is the release, for other uses, of a considerable amount of equipment which is ordinarily required in the maintenance of such roads.

The procedure for carrying out a program of this nature is described as follows:

In the selection of the roads to receive this light treatment, preference is given to connecting links, which carry light traffic as indicated by traffic surveys. Consideration is also given to the stability of the sub-

By H. D. METCALF

Director of Maintenance and Equipment,
Kentucky Department of Highways, Frankfort

grade, which usually can be determined by how well the road itself has withstood unfavorable weather conditions, and by the amount of aggregate that has bonded into the roadway surface.

After a road has been selected for the special treatment, the existing floater aggregate is bladed to the center in a windrow, and the amount per square yard on the road is determined by visual inspection or by measuring, and, if necessary, additional aggregate is then added to bring the amount to 40 or 50 lb. per sq. yd. of roadway surface.

After this uniform quantity has been obtained throughout the project, it is bladed neatly to the shoulder of the road. A prime is then applied, consisting of 0.50 gal. of MC-1 or RT-2 per sq. yd. This is allowed to penetrate for a day or so, as a thorough penetration of the base by the prime is essential.

A tack coat, consisting of .15 gal. of MC-3, is applied to the primed surface and immediately covered by blading the windrowed material back over the primed surface. In the blading process, uneven spots are leveled up and the riding quality of the road improved by dragging with a wire mesh drag. This drag is towed by a light truck, at a speed of 5 to 7 miles per

hour. More mulch aggregate is added to cover any thin places that may develop in the manipulation of the floater material.

The floater is now ready for a penetration of .35 gal. of MC-3, to be followed immediately with an application of 25 lb. per sq. yd. of chips of a size 100% passing a $\frac{1}{2}$ in. screen. This chip seal is spread evenly through spreader boxes and does not require dragging.

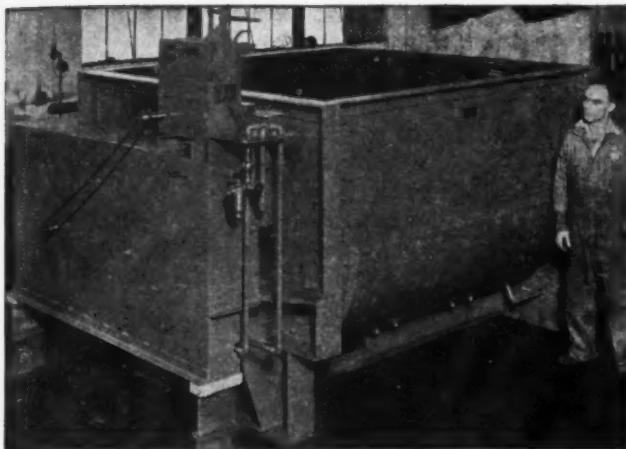
Immediate rolling with a 7- to 10-ton smooth wheeled roller completes the surface operation.

A follow-up operation considered desirable by the Kentucky Department of Highways includes the blading off of high shoulders, and the cleaning of ditches.

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J. Stephen Watkins is commissioner and T. H. Cutler chief engineer of the Kentucky Highway Department.



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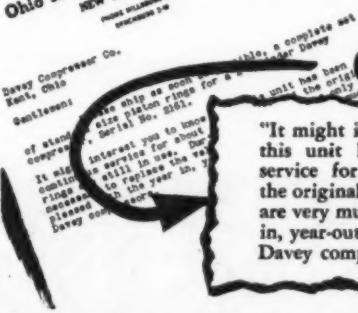
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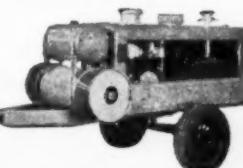
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How a Truss Was Replaced without Traffic Interruption

A FAILING 120-ft. through timber truss was replaced without holding up traffic and another bridge thus kept in service by the method herein reported by the California Division of Highways.

The bridge in question spans the Consumnes River, on state route 65 between Plymouth and El Dorado. The approach trestle, in fair condition, was not disturbed.

First considered was the expediency of placing bents under the floor beams and converting the old truss to a "duration" trestle. High water channel requirements ruled this out.

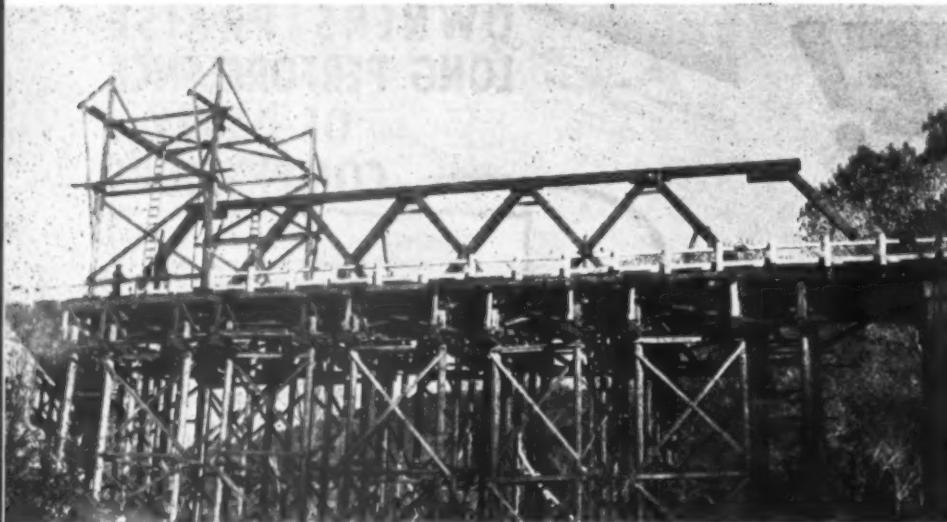
The new span was fabricated only after solving some material problems. A local mill could produce timber only up to 22 ft. in length, and could not furnish the 20 x 26-in. timber floor beams desired. State-owned I's from a maintenance yard were substituted in the floor system, and truss members were fabricated using three 6 x 14-in. laminated timbers, the splices being staggered along the

chord members. These elements plus the steel hanger rods, castings, splice plates and hardware from the old bridge, made up the new bridge.

The steel floor beams were hung from the (double) hanger rods. Rods had to be turned 90 degrees from their former positions to straddle the floor beams, connecting plates forming the beam seats.

Traffic Uninterrupted

To provide for uninterrupted traffic during the dismantling of the old truss and erection of the new, the deck of the truss span was supported on temporary bents located on both sides of each floor beam. These bents were extended on each side of the trusses to support a track for the legs of a gantry traveler which the contractor used for dismantling and erecting. The new trusses were framed and assembled for fit on a large platform in a yard, adjusted as necessary, then taken apart and hauled to the site for erection.



Falsework bents were placed on either side of each floor beam. Truss erected by traveling gantry shown here under construction, the gantry leaving a clear roadway

Laminated wood plus salvage I's made up the new truss



(Continued from page 99)

entirely skeptical of its ultimate effectiveness? What was there to lose by waiting a year or more, comparable to the loss of hundreds of thousands of American lives that would surely occur in land battles?

German scientists, it was believed, were at fever heat in an effort to make Hitler's "secret weapon" a reality. But the strategic bombing of German factories was going on in such devastating fashion that even if the Germans had attained technical success in making atomic bombs on a small scale in their laboratories, large scale production was doomed.

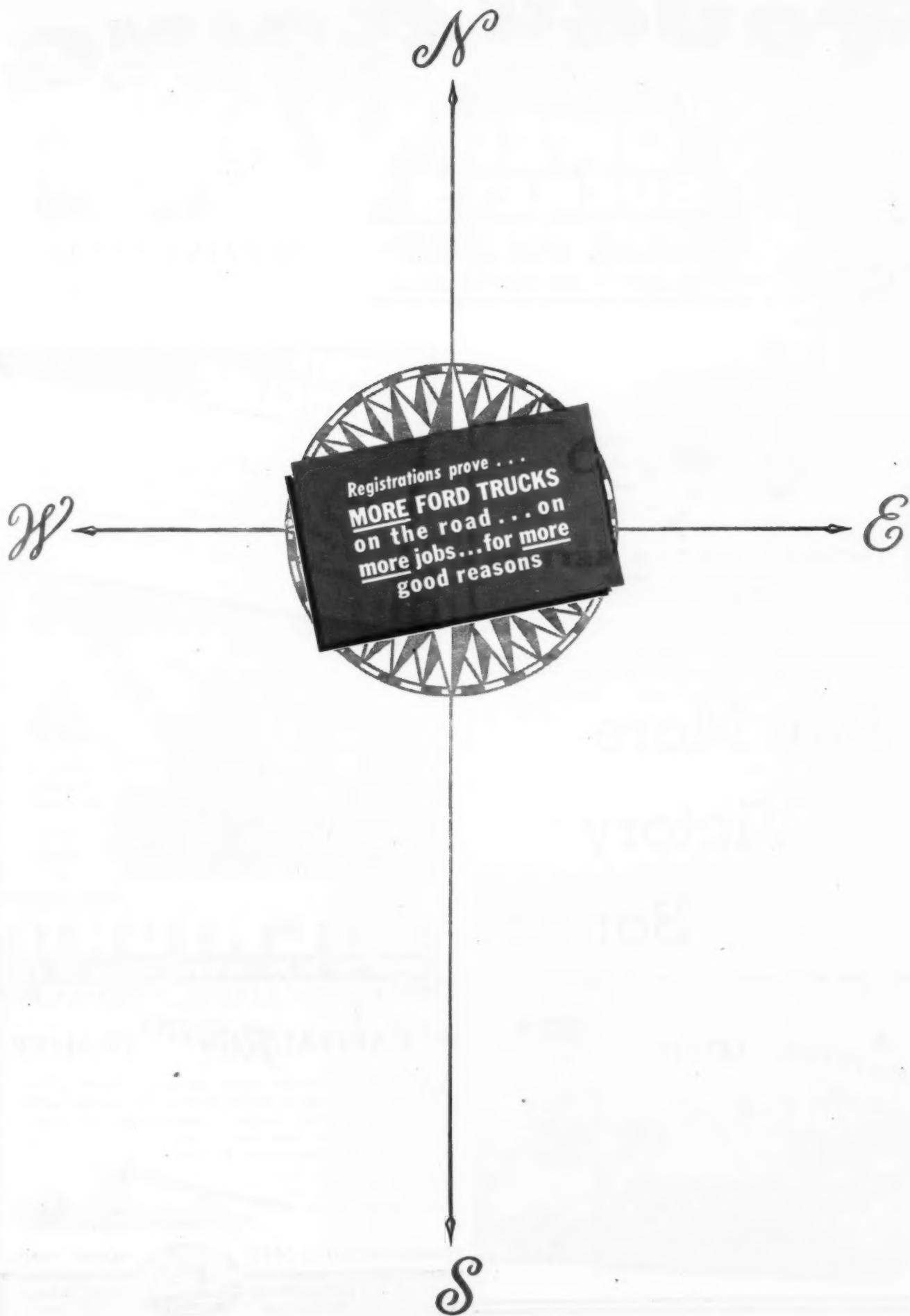
Our highest military leaders, it should be remembered, received most of their schooling before radium was discovered. What is much more important, their subsequent experience and training were not such as to have produced more than lip-service to the doctrine that scientific research had become the Aladdin's lamp of the industrial world.

Miami Analyzes Postwar Traffic Safety Needs

The city of Miami, which has seen tremendous growth in its street traffic during the war, has taken steps to analyze its postwar traffic needs. At the request of the city's director of public safety, D. Grant Mickle, traffic engineer of the Automotive Safety Foundation, Washington, D. C., made a brief overall survey of street traffic problems as related to engineering needs.

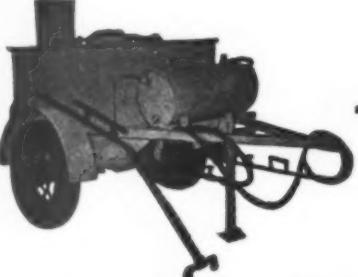
This survey, which has reported under the title "Improvement of Traffic Facilities," involved interviews with city officers and civic leaders and field observation in company with traffic police officers.

In 1944, Miami had one of the nation's highest fatality rates in any city of its population group, 18.5 per 100,000 population as compared to only half this rate for some cities. One recommendation was a realignment of police responsibilities, in line with the excellent example in Detroit, which has halved its accident rate. Also recommended was replacement of obsolete traffic signals and readjustment of signal timing to handle combining pedestrian and vehicle flow; greater use of painted center and lane lines and other pavement markings; clearer directional signs to aid visiting motorists, and establishment of a modern traffic engineering bureau.



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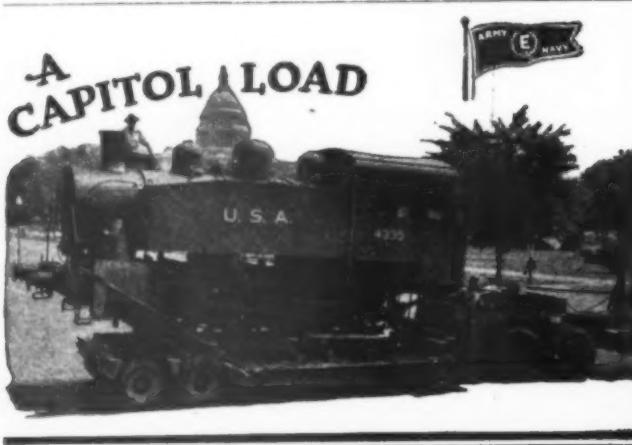
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Hard-Facing Worn Gears of Crawler-Type Tractors

EVERY year more and more operators of heavy equipment are learning that hard-surfacing, or "hard-facing" as it is generally called in the welding trade, is one of the most economical and successful methods of maintenance.

Hard-facing has become standard procedure for rebuilding worn running gears of crawler-type tractors in a number of industries. Field tests under the most severe conditions and in all types of soil have shown that correctly applied hard-facing will prolong the life of the running gears up to five times. As a direct result of increased life, fewer replacements are necessary.

The resultant saving is figured not on the basis of new parts cost vs. hard-facing costs, but in the enormous saving of production time normally lost while the equipment is shut down during parts replacement. In some instances, the time involved in replacing new running gears, plus the idle labor during the replacement, is far greater in cost than the cost of the replacement itself.

In rebuilding worn tractor gears, experience has taught welders that it is much easier and quicker to hard-face by the electric arc method the top rollers, sprockets and idlers while *still on* the tractor, unless the parts need to be removed for other repairs. Success of the hard-facing application depends on the welder's adherence to the following points:

(1) If the parts to be hard-faced are preheated, using a torch to remove the chill from the base or parent metal, the possibility of warpage or distortion will be reduced to a minimum.

(2) Set the welding machine much higher than used for mild steel electrodes, and hold a long arc. If direct current is used, reverse polarity is recommended.

(3) Apply the hard-facing with a

By ROBERT E. TURMAN
Mir-O-Col Alloy Co., Los Angeles

circular or whipping motion, working back over the deposit to keep the metal fluid long enough to float all impurities to the surface. With practice, the hard-facing metal can be applied smooth enough to dispense with any grinding on the finished work.

Helpful Procedure Hints

Lift the tractor with a jack until the tracks are off the ground, then remove the master pin and drop the tracks. Pull the tracks to the front or rear of the tractor and leave them flat on the ground, to be hard-faced in this position. Next, remove the bottom rollers. The remaining parts do not have to be removed from the tractor.

(a) **Hard-Facing Bottom Rollers**—If the bushings or bearings in the rollers do not have to be replaced,

the rollers should be hard-faced with the entire bearing surface submerged in water. This will keep the bushings cool and avoid any damage from excessive heat of the arc.

The job will be easier if the roller is placed in a jig with an arrangement for turning the roller during the deposition. Apply the hard-facing

Moving Snow with Motor Grader

Motor graders play an important part in clearing the snow from the streets of Billings, Mont. The illustration shows how a snow fall of Jan. 4, 1945, was handled. The Caterpillar motor graders windrowed the snow to the center of the street. It was then loaded into trucks by means of a Caterpillar tractor with Trackson Traxcavator.



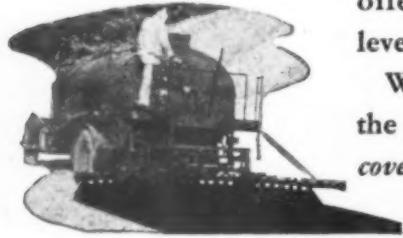
Clearing Street in Billings, Mont., with motor grader by windrowing snow to center

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on the top surface, turning the roller slowly until the entire circumference is hard-faced with a smooth layer of metal in one continuous operation.

If the roller is worn down excessively (over $\frac{1}{4}$ in.), it will be wise to build up the part with mild steel to within $\frac{1}{4}$ in. of the correct size, then hard-facing to required dimension. If the flange is cracked or partly broken, it can be repaired with mild steel and then hard-faced. In cases where the bearings have been removed beforehand, there is no necessity for water cooling the roller during the hard-facing procedure.

Recommended electrode size—3/16-in. diameter.

Approximate heat—200 to 225 amperes. (This will vary with shop conditions.)

Approximate amount of material— $2\frac{1}{2}$ lb.; application time—30 min.

(b) **Track Links**—If new pins and bushings are to be installed, or if the old ones are to be turned, this should be done before the links are hard-faced. Lay the entire track on the ground, and apply a single bead beginning at one end and hard-facing successive links of the entire track. Care should be taken to prevent any weld metal from "arc-ing" across the hinged part between the links. Never hard-face the complete surface of a single track link at one operation, because the excessive heat from the arc tends to warp the track. Four separate beads are required to hard-face the entire link surface. At the completion of each bead, return to the starting link and apply the next bead parallel, continuing from link to link of the entire track.

(c) **Grousers or cleats**—One pass of hard-facing on the grousers will extend the life's wear of the pads. Do not make a continuous weld across the grouser, but skip approximately 1 in. opposite the bolt head of the pad. This eliminates any structural stresses in the pad and decreases the possibility of breakage when the tractor is in service.

Several large contracting companies now weld a strip of concrete-reinforcement steel onto the cleat, then apply hard-facing to the steel. This provides a cleat or grouser with much longer service life than the original cleat and at a great saving over manganese steel grousers. The cleat should be welded with any good mild steel electrode, then allowed to cool before depositing the hard-facing alloy.

(d) **The Idler**—Use skip welding to keep the heat evenly distributed

(Continued on page 125)



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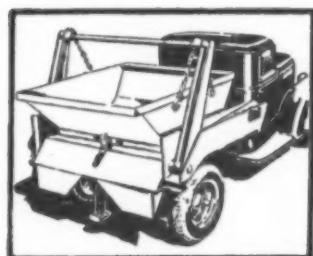
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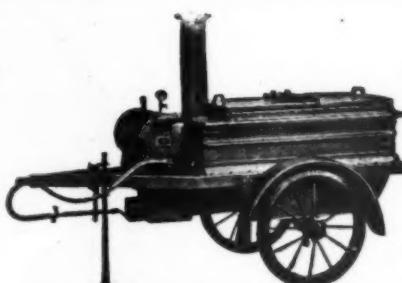
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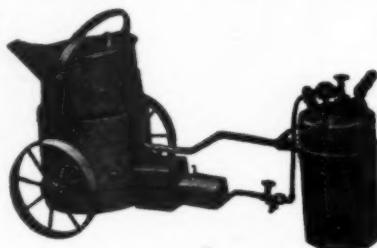
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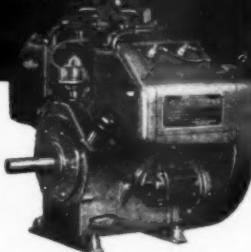
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Connecticut Plans 50 Standard Truck Garages

PLANS for a standard truck garage have been readied by the Connecticut state highway department, looking toward the rapid modernization of its equipment maintenance facilities. About fifty building units are slated for construction as rapidly as possible when all war restrictions are ended. The standard building is proposed for use throughout the state for storage of maintenance and roadside equipment, including trucks. The basic plan is for four stalls. Buildings can be expanded to as many stalls as are needed in the particular area served.

The department is presently operating about 350 heavy duty trucks which are used during the winter season for snow removal and sanding. The garage is so arranged and dimensioned that trucks can be housed without removal of the plow.

These 50 buildings are mainly for storage.

The building will include three doors on each side of a central "office" bay. Smaller standard buildings will include space only on one side of this bay. These doors are 12 ft. wide and 11 1/2 ft. high. The 36x42 ft. floor area drains to the center.

Also contemplated are six modern district office buildings, now in the preliminary design stage, the cost to be about \$200,000 each. Each unit would house a district office, and pro-

vide a central machine shop for automotive equipment as well as space for roadside development equipment. The unit will occupy approximately a 10-acre area, equipped with rail siding and outside storage space for snow fence, drainage pipe, guide rail posts, bituminous materials, etc.

The foregoing details were provided by A. M. Walters, business manager, Connecticut state highway department, of which William J. Cox is commissioner. Planning and construction of such facilities is under the department's Bureau of Business Administration.



Before—and after 12 minutes of application of Rock Salt on Washington St., Boston

ROAD AND STREET CONSTRUCTION METHODS AND COSTS

A NEW BOOK OF DATA

By

HALBERT P. GILLETTE and JOHN C. BLACK

This book was planned expressly for use by contractors, engineers and highway officials. It is not a textbook, but a compendium of data, carefully selected with reference to their usability by highway builders and other persons concerned with highway construction costs.

In general the data are of two main classes—dollar and cents costs per mile, per square yard, per cubic yard, and the like, for use in quick approximate estimates; and details of material, labor and equipment costs, with records of man-hours and machine-hours, for use in close estimating and in studies to reduce costs or improve methods.

The data are from a great number of different sources, and are in widely varying detail.

All major articles carry descriptions to show clearly the class of work and the methods for which costs are given, and to provide a basis for further reference and study if desired.

Location and date of job and the source of information are given in the title and introduction to each article.

The grouping of subjects in chapters is convenient, but an unusually complete index is furnished as the main guide to any subject or sub-subject sought.

The authors are both men of practical experience in highway and other construction. Both are members of the American Society of Civil Engineers.

OUTLINE OF CONTENTS

CHAPTER 1. INTRODUCTION—Brief discussions of construction costs, prices and the uses of cost data.

CHAPTER 2. COST INDEXES—Indexes of the U. S. Public Roads Administration and Interstate Commerce Commission, with brief explanations of their construction, uses and limitations.

CHAPTER 3. OVERHEAD COSTS—Separate discussions of the overheads incurred by contractors and by states, counties and cities.

CHAPTER 4. ENGINEERING—Data from states, cities and other sources on the costs of various kinds of surveys and other engineering. There are brief articles on aerial surveys and seismographic soil and rock surveys.

CHAPTER 5. RIGHT-OF-WAY—A general discussion followed by records of actual experience and costs.

CHAPTER 6. EQUIPMENT—This chapter contains several rental and ownership expense schedules in full detail, followed by articles on operating and maintenance costs, including records of fuels, lubricants, etc., a mathematical analysis of the problems of selecting and retiring machines, and a table of depreciation rates.

CHAPTER 7. LABOR—Schedules of established minimum wage scales and records of wage rates in various states; comparisons of contract work and day labor; convict labor costs and other pertinent matter.

CHAPTER 8. CLEARING AND GRUBBING—Records of clearing with tractor-mounted equipment, hand and horse methods, stump blasting, etc.

CHAPTER 9. GRADING—Eighty-four pages of articles on grading with power shovels, scrapers of various types and sizes, elevators, blade graders, bulldozers, etc.; hydraulic grading; rock drilling and blasting; winter grading; special swamp grading; minor operations and hand work.

CHAPTER 10. HAULING AND HANDLING MATERIALS—Studies of hauling operations on power shovel jobs, concrete construction and bituminous construction; truck movements at yards; industrial rail-ways; team and wagon hauling; and other articles.

CHAPTER 11. PRODUCTION OF AGGREGATES—Articles on labor requirements and costs of producing sand, gravel and crushed stone at various locations.

CHAPTER 12. UNTREATED BASES AND SURFACES—Waterbound macadam, crushed rock and gravel construction.

CHAPTER 13. STABILIZATION OF BASES AND SURFACES—This chapter is devoted chiefly to work with calcium chloride, articles on portland cement and bituminous stabilization being given in the chapters on concrete and bituminous construction.

CHAPTER 14. BITUMINOUS SURFACES AND BASES—The five parts of this long chapter contain articles on various methods in different states: Part 1, Surface Treatments; Part 2, Bituminous Macadam; Part 3, Mixed-in-Place Construction; Part 4, Traveling Plant Construction; Part 5, Stationary Plant Construction.

CHAPTER 15. CONCRETE SURFACES AND BASES—Contains numerous detailed records of construction. There are articles on work with 27-E pavers, 34-E pavers, tandem set ups, batching, hauling, curing, joints, cement-bound macadam, soil-cement roads, stabilization, and other subjects.

CHAPTER 16. BRICK PAVEMENTS—Records of brick pavement construction from various cities and states, including an article on vibrated monolithic. Short references to granite block.

CHAPTER 17. SIDEWALKS, CURBS AND GUTTERS—Miscellaneous prices and details of construction.

CHAPTER 18. WALLS, FENCES AND GUARD RAILS—A brief chapter of data on these items of highway construction.

CHAPTER 19. BRIDGES AND CULVERTS—Cost data on a large number of steel, concrete and timber bridges and grade separations—also culverts of various types. There are two articles on pump installations for underpass drainage.

CHAPTER 20. TUNNEL CONSTRUCTION—Detailed descriptions and data on the construction of 27 highway tunnels in the West.

CHAPTER 21. GRASS, SHRUBS AND TREES—Several articles on plantings for landscape improvement and bank protection.

CHAPTER 22. MISCELLANEOUS—Data on pedestrian underpasses, street car loading platforms, truck weighing stations, catch basins and manholes, lignite binder, water pumping, signs and markers, traffic striping, parking meters, highway lighting, radio communication with snow plows, accident prevention, and weather and construction.

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(Continued from page 120)

and thus preventing warpage. It is advisable to determine the desired thickness of the metal to be applied and deposit it in one pass. Excessive heat in any one spot will tend to warp the idler. The pads of hard-facing never should exceed 4 in.

When the idler is badly worn, the same type of build-up with mild steel is used as was described for hard-facing the bottom rollers. To build-up the idler, run a small bead around the entire idler on one side of the divider ridge, then repeat this operation on the opposite side of the ridge. Continue this method, joining each bead with the one preceding, until the entire wearing surface is covered; then, while the idler is still warm from this operation, apply the hard-facing as outlined above.

Recommended electrode size—3/16-in. diameter.

Recommended heat—approximately 200 amperes. (This will vary.)

Approximate amount of hard-facing—6 lb.; labor time, about 3 hours.

(e) The Drive Sprocket—In hard-facing the drive sprocket, the same precautions should be observed as in all previously mentioned parts. Do not allow any excessive build-up of heat on any one part of the sprocket. Place a single bead or pass of hard-facing—about $\frac{1}{4}$ in. in length—across the end of one tooth, then apply a similar bead on each succeeding tooth around the entire sprocket. Continue to deposit the hard-facing in small portions until all the sprocket tooth surface has been covered. Use a circular motion when depositing the hard-facing metal, and be sure to set the welding machine high enough to turn the electrode a dull red its entire length during the application.

It is vitally important that the sprocket gears be smooth upon completion, since a roughly finished sprocket tends to cut away the track bushings. Within a short time, an adept welder can learn to apply the hard-facing without roughness or porosity and thus avoid any grinding after the job is completed.

To avoid depositing too much hard-facing metal, it is advisable to use a template for caliper the gears. Too much metal deposited may tend to prevent the sprocket from correctly meshing with the bushings, and in some cases this would result in cracked sprockets. If a template is not available, a track bushing can be used instead, for measurement.

Recommended electrode size—5/32 in. diameter.

Recommended heat—148 amperes.

Approximate amount of material—5 lb.; labor time, about 4 hours.

**WGB
CLARIFIERS**



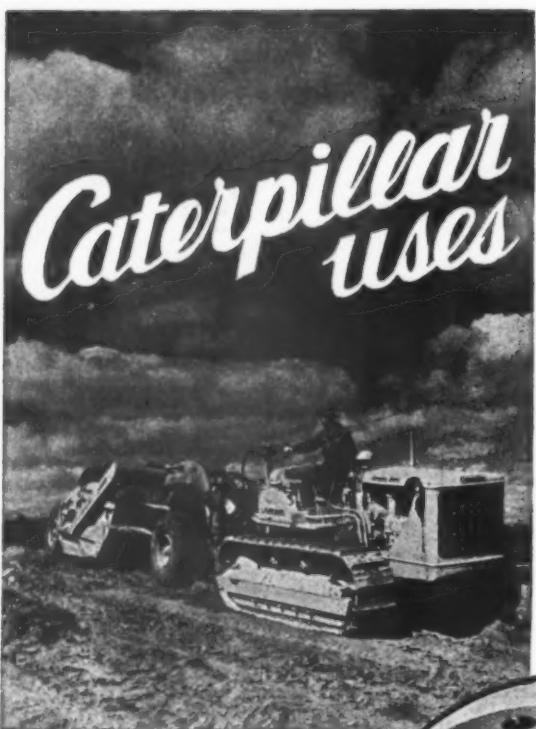
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The oil lasts longer—and so does the engine. Here's the reason. The exclusive WGB cartridge removes from oil not most, but *all*, the enemies of engine-life—dirt, sludge, water, harmful acids, colloidal carbon. It is easily installed by hand, without tools, and replacements cost less than oil changes. Heavy-duty WGB Clarifiers, for all gas and Diesel engines, are rugged, simple in design and operation, and each model is specifically designed for the job it has to do. Bank on the proved reputation of WGB oil clarifying. It saves time, money, overhauls, oil, and irreplaceable engine parts.

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for the asking.



WGB
OIL CLARIFIER, INC.
KINGSTON, N. Y.



Many of the Tractors built by the Caterpillar Tractor Company, such as the Diesel D7 shown above working near Cedar Rapids, Iowa, are equipped with R B C HEAVY DUTY ROLLER BEARINGS, designed to take heavy shock loads and to endure years of gruelling service. R B C BEARINGS are built to a standard of quality developed by over a quarter-century of experience. Precision manufacturing methods, coupled with the most rigid inspection of raw materials and finished parts, are positive assurance of long, dependable service.

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ROLLER BEARING COMPANY of AMERICA

TRENTON . . . NEW JERSEY

President Recommends Immediate Release of \$500,000,000 Federal Aid

In his message to Congress on Dec. 6 President Truman recommended a broad public works. This included:

(1) Reclamation, rivers and harbors, flood control and conservation projects; (2) construction of necessary federal buildings throughout the country; (3) the release for immediate expenditure of postwar highway spend-

ing authority voted by Congress to become effective at the rate of \$500,000,000 a year for each of the first three post-war years; (4) appropriation of \$25,000,000 to continue the construction of the Inter-American highway through Central America to the Canal Zone; (5) the construction of 3,000 new airports and the improvement of 1,500 others; (6) grants to state and local governments for public works and (7) the provision of federal grants for the construction of hospital and health centers.

Stabilizing Board for Construction Agencies Recommended

In an address presented at a conference on postwar planning at Washington, D. C., last month, Charles M. Upham, Engineer-Director, American Road Builders Association, stated that when construction falls below a figure approximately 12% of our national income, depression threatens. He recommended that a stabilizing board representing all construction agencies be set up which by controlling public investment would maintain this figure as a minimum. His address, in part, follows:

"We find many proofs of the high-powered influence of construction in our national economy. It is significant that in times of prosperity we have a relatively large construction program—above 12% of our national income—and in times of depression, we have a low construction program considerably below 12%.

"While there is general agreement on the necessity for a large construction program to keep us prosperous and advancing, there is some difference of opinion as to the size of the program that should be carried on. The exact size can be estimated from past experience, and there are other barometers that will determine the size more exactly as we approach the time when we have sufficient employment to maintain a buying power that will keep business active.

"This total construction program is made up of two major parts—private investments which include housing, industries, railroads and other enterprise financed with private capital—and public investment which includes construction which is paid for by taxation derived from all levels of government. Highways and streets come under this category.

"Generally in prosperous times the total construction program is made up of approximately $\frac{1}{3}$ from private investments and $\frac{1}{3}$ from public investments. Taking into consideration a \$300 billion debt which must be carried at enormous expense, a better ratio might be $\frac{1}{4}$ by private investments and $\frac{3}{4}$ by public investments. The important point is that at all times there should be a minimum of total construction of at least 12% of our national income.

"It is difficult to control private investments. This rate of investment is influenced by many things. It is controlled by the individual or private groups swayed by the enthusiasm of the times, tax laws, buying power,

availability of funds, rates of interest and other forces. On the other hand, public investments can be controlled as has been shown in recent years. Public investments can be maintained at a high level, or they may be deferred as the highway program has been deferred during the war period.

"Since it is difficult to control private investments and relatively simple to control public investments, then it is quite evident that in order to maintain a total construction program of a certain size, the part to be varied is that of public investments. In those years when private investments are relatively high, public investments over and above the required minimum should be deferred. In those years when private investments are low, then public investments should be made to bring up the total construction program to approximately 12% of our national income. In this manner the construction program can be stabilized at the required minimum.

"The problem we face is how to control our national economy in a practical way so that the total construction program inventory can be maintained on a stabilized basis. Inasmuch as the controllable portion of the construction will be of public investment, it indicates that Congress should set up a stabilizing board. This should have representation of all the construction agencies of the federal and state governments that would furnish information for the activity of such a board, yet the direction of this board could be with the Federal Works Agency. The board should report to Congress and Congress should perform the necessary regulations for stabilization.

"Satisfactory operation of this set-up would mean that when a total construction program of insufficient size to maintain a prosperous economy was indicated, the federal and local public works should be put under contract. In those years when there is a high construction program—higher than the critical amount—and the labor market is such that inflationary tendencies will ensue, then the board through Congress would defer any federal public works and recommend the deferment of local public works beyond the absolute minimum requirements. In this manner a stabilized total construction program—the potential factor having more to do with the basis of our national economy than any other factor—can be stabilized at the proper amount.

"A total construction program of approximately 12% of our national income will maintain prosperity. A stabilization board could work with Con-



RUGGED TOOLS for TOUGH JOBS

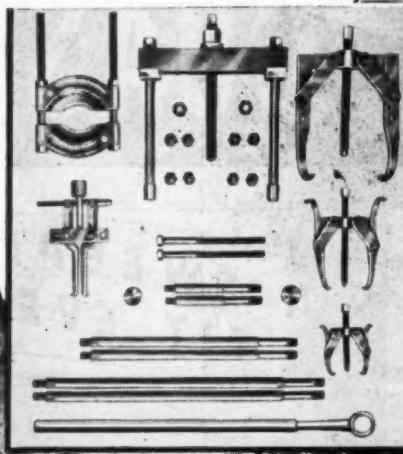
DEPENDABLE heavy duty tools for pulling and installing bearings, gears, sleeves, wheels, shafts and other close-fitting parts. Made of high alloy, drop forged, heat-treated steels, precision machined—strong, easy to handle, portable, **SAFE** to use, **FAST**-working! Approved by Hyatt, M-R-C, New Departure, SKF, Timken, and by Tractor Manufacturers.

OTC PULLERS and Attachments, BOX WRENCHES and other tools in sizes to handle practically every maintenance job.

FACTORY APPROVED CATERPILLAR SET
Essential service equipment for all CATERPILLAR Tractors; also used on other tractors and on road machinery. Other sets available to meet your needs.

Write for OTC Maintenance Bulletin showing many time-saving OTC uses.

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gress and control these activities in such a manner that there would be prosperous conditions. This should be a policy board working with our public construction agencies at both federal and state levels. Actual acceleration or deferment of construction should be done by Congress.

\$5,200,000 Granted for Alaskan Highway—Approval of priorities for work and equipment necessary for upkeep and improvement of Alaskan highways to cost \$5,200,000 has been granted to the Alaska road commissioner by the War Production Board.

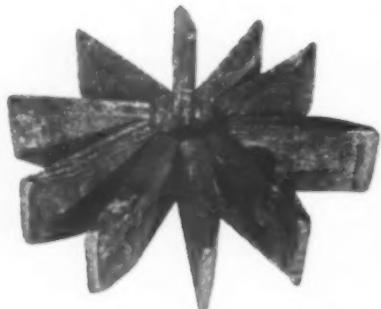
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We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalogue RS-19 of Engineering Instruments, Engineering Field Equipment and Drafting Room Supplies.

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Each Dipper Tooth made GOOD AS NEW in only 30 Seconds!



Shovel digger teeth wear rapidly. Particularly in rocky soil and gravel where they are subjected to excessive abrasion, shock and impact.

To make the teeth of buckets more wear-resistant, to keep them sharp longer and avoid frequent replacement, many companies are relying exclusively on Coast Metals Hard-Facing. Applied to the teeth, as well as lips, runners and other parts,

it successfully protects these vulnerable points so that the bucket functions more effectively, more quickly, and at a significant saving in power. After the teeth become slightly worn, they are then given another Coast Metals Hard-Facing and once again made good as new . . . in only 30 seconds!

Coast Metals Hard-Facing meets today's needs for making all machinery, equipment exposed to severe wear last longer. Easily applied by the electric arc or gas torch to any ferrous metal including manganese steel, alloy steel, cast iron and chilled iron. New revised edition of Form X-201 goes into full detail. Write for your copy today.

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MAKE YOUR EQUIPMENT LAST LONGER

Gasoline Consumption Increased in 1944

Private and commercial vehicles consumed approximately 16,090,000,000 gal. of motor fuel in highway travel in the 48 states and the District of Columbia in 1944, according to figures compiled by the Public Roads Administration from reports submitted by the states.

This was an increase of approximately 422,000,000 gal. above the motor fuel consumption for highway usage in 1943. The 1944 motor fuel consumption, however, was only 68 per cent of the 23,638,000,000 gal. consumed by private and commercial vehicles in 1941, prior to wartime restrictions on motor vehicle travel.

The total amount of motor fuel consumed in 1944, including public and private vehicles and non-highway usage but excluding military use, was approximately 19,524,000,000 gal., as compared with a total of 18,871,000,000 gal. consumed in 1943.

Analysis of motor fuel consumption by months showed the highest rate of consumption in June, with a total of 1,793,000,000 gal. consumed, against a total of 1,742,000,000 gal. in May and 1,726,000,000 in August. Consumption was lowest in February.

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A HEATER
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Also Drag Brooms,
Sheepsfoot and
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Garbage Collection Bodies.



Sweepers of the Motor
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Tractor attachment type.

Tractor front end sweepers, like all Grace sweepers, sweep right or left.

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The Grace Rapid Fire Circulating and Steam Heater for Tank cars of asphalt. Fast heating to any required temperature, whether contents are solid or liquid.

W. E. GRACE MFG. CO.

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Dallas, Texas

Powers' Catalog Column

Equipment specifications published in the current issue of Powers' Road and Street Catalog are as of February 1, 1945. New models, discontinuances and revisions to August 1 have been reported as follows:

Crawler Tractors

CATERPILLAR—Minor changes in shipping weights:

D8	34,450 lb.
D7	23,910 lb.
D6 wide	16,990 lb.
D6 narrow	16,530 lb.
D4 wide	10,390 lb.
D4 narrow	10,140 lb.
D2 wide	6,950 lb.
D2 narrow	6,790 lb.

Wheel Tractors

J. I. CASE—Model DI. Small changes in speeds:

First	2.30 mph
Second	4.40 mph
Third	6.08 mph
Fourth	12.25 mph
Reverse	3.47 mph

CATERPILLAR—DW 10:

Details of this tractor are given on Powers' Catalog pages 238 and 239, as a part of the specifications for semi-trailer scrapers.

MINNEAPOLIS-MOLINE — Various revisions as follows:

MM RTI Single Rears

Ground clearance—11".
Turning radius—156".
Front tires—2-7.50x16 (8 ply), 48" tread.
Rear tires—2-12.00x24 (6 ply), 45" tread.
Belt pulley—12 $\frac{1}{4}$ " diam.—1000 RPM.
Belt speed—3200 FPM.
Drawbar vertical adjustment—13", 15", 17".

MM RTI Dual Rears

Shipping weight—5000 lb.
Ground clearance—11".
Turning radius—156".
Front tires—2-7.50x16 (8 ply), 42" tread.
Rear tires—4-12.00x24 (6 ply), 60 $\frac{1}{4}$ " tread.
Belt pulley—12 $\frac{1}{4}$ " diam.—1000 RPM.
Belt speed—3200 FPM.
Drawbar vertical adjustment—13", 15", 17".

MM UTI Single Rears

Engine horsepower—49 HP.
Width of tractor, overall—70".
Front tires—2-7.50x16 (6 ply), 52 $\frac{1}{4}$ " tread.
Or 2-8.25x20 (10 ply), 56" tread.
Rear tires—2-14.00x28 (8 ply), 54 $\frac{1}{2}$ " tread.
Belt pulley—15 $\frac{1}{2}$ " diam.—741 RPM.
Belt speed—3010 FPM.

MM UTI Dual Rears

Engine horsepower—49 HP.
Front tires—2-7.50x16 (6 ply), 52 $\frac{1}{4}$ " tread.
Or 2-8.25x20 (10 ply), 56" tread.
Rear tires—4-12.00x28 (6 ply), 69" tread.
Belt pulley—15 $\frac{1}{2}$ " diam.—741 RPM.
Belt speed—3010 FPM.

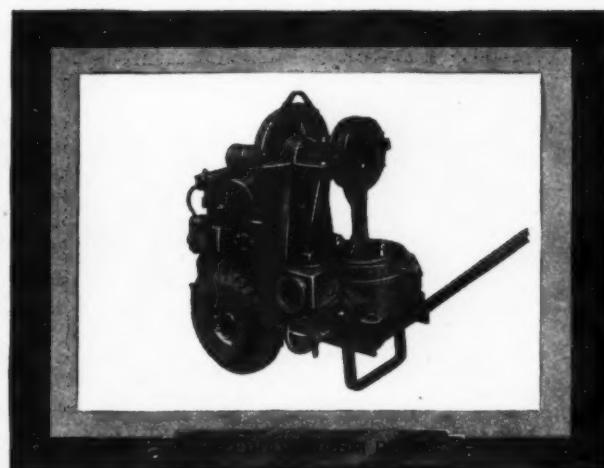
MM GTA Single Rears

Front tires—2-7.50x18 (6 ply), 53 $\frac{1}{4}$ " tread.
Rear tires—2-15.00x30 (8 ply), 60" tread.
Belt pulley—16" diam.—656 RPM.
Belt speed—2790 FPM.

MM GTA Dual Rears

Front tires—2-7.50x18 (6 ply), 53 $\frac{1}{4}$ " tread.
Rear tires—4-13.00x28 (8 ply), 72 $\frac{1}{2}$ " tread.
Belt pulley—16" diam.—656 RPM.
Belt speed—2790 FPM.

— in the Picture



Diaphragm Pumps are definitely in the picture for postwar construction! They are designed and built to handle water that is laden with mud—sludge—sand—gravel—and other debris!

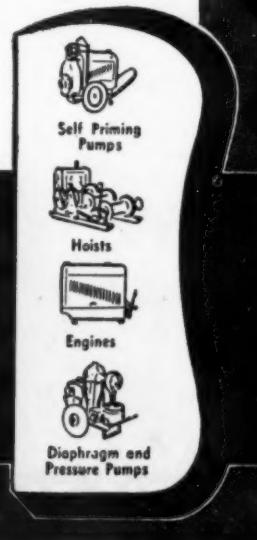
Novo Diaphragm Pumps feature the ECCENTRIC DRIVE instead of the old-fashioned walking beam. This eccentric drive means fewer moving parts—shorter over-all length—less dead weight! When the going is heavy—the Novo Diaphragm Pump is a real "mudder!"

To get the true picture of the Novo Diaphragm Pump, consult your Novo Distributor, or write for Bulletin No. 167-C!

Your Novo Distributor will be happy to help you with your equipment questions.

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NOVO ENGINE CO.



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★ Vibratory Tables, etc.

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ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON MICHIGAN

Bulldozers

HEIL—CE-9-BW (a new model):
For use with International TD-9 tractor.

Shipping weight—1950 lb.

Blade width—96".

Blade height—30".

Control—Cable.

Blade lift—41".

Blade drop—Unltd.

Hold position—Yes.

Float position—Yes.

Cable size—7/16".

Cable length—75'.

CE-18-BW—Revised cable length 100'.

CE-14-BW—Revised cable length 100'.

Trail Builders

HEIL—CE-9-TW (a new model):
For use with International TD-9 tractor.

Shipping weight—2500 lb.

Blade width—120".

Blade height—27".

Blade angle—27 1/2°.

Blade tilt—10°.

Control—Cable.

Blade lift—50".

Blade drop—Unltd.

Hold position—Yes.

Float position—Yes.

Cable size—7/16".

Cable length—75'.

CE-18-TW—Revised cable length 100'.

CE-14-TW—Revised cable length 100'.

Road Rollers

HUBER—3-4 ton Tandem (A new model):

Shipping weight—Max., 6660 lb.

Working weight—8800 lb.

Wheel base—80".

Length—Overall, 124 1/2".

Width—Overall, 48".

Height—Overall, 67".

Engine—Wisconsin.

No. Cyl.—4.

Size—3 1/4" x 3 1/4".

Displacement—107.8 cu. in.

Horsepower—20 HP @ 1800 RPM.

Speeds—

First, 2.6 mph.

Second, 4.4 mph.

Reverse—Same as forward.

Clutch—Twin disc.

Ground clearance—12".

Steering—Hand automatic.

Fuel tank capacity—10 gal.

Front roll—Dia., 27".

Front roll—Width, 34".

Front axle—Dia., 2".

Rear roll—Dia., 44".

Rear roll—Width, 38".

Rear axle—Dia., 3".

Water capacity—190 gal.

Compression—

Front roll—59 lb. per lin. in.

Rear roll—Min., 115 lb. per lin. in.

Rear roll—Max., 160 lb. per lin. in.

Sprinkler tank capacity—70 gal.

Air Compressors

GARDNER DENVER—Changes as follows:

Model WHD-105, skid mounted

Length—101".

Width—44".

Height—52".

Net weight—3175 lb.

Model WBF-210-D

Capacity fuel oil tank—40 gal.

Model WBG-315-D

Rated engine speed—375 RPM.

Net weight—Skid-mounted, 10,470 lb.

Model WBH-305-D

Rated engine speed—870 RPM.

Overall length—Skid-mounted, 165".

Model WBK—500-D

Rated engine speed—1035 RPM.

Overall length—Skid-mounted, 198".

Overall width—Skid-mounted, 75".

Overall height—Skid-mounted, 78".

Net weight—Skid-mounted, 15,000 lb.

Jaw Crushers

PIONEER—The following models have been discontinued:

W 612
W 810

C 1020
C 1030

W 918 C 1524
C 924 C 1536
C 936 W 1836

Single Blade Snow Plows

WAUSAU IRON WORKS—Various changes as follows (Numbers in parenthesis refer to notes in Powers' tables):

B-31W (3)

Designed for 2-4 ton truck.
Moldboard thickness—12 ga. alloy steel.

B-31-45

Designed for 1½-4 ton truck.
Weight—Plow only, 715 lb.
Weight—Plow with push frame, 1482 lb.
Moldboard length—10'10".
Moldboard height (nose)—2'6".
Moldboard height (outer edge)—4'4".
Moldboard thickness—12 ga. alloy steel.

Cutting edge—1-8" x 108" x ½".

Plowing width—7'8".

Angle of blade—58°.

Shoes—2-4" x 15".

B-150—

Cutting edge—1-8" x 126" x ½".

100 RBH—

Plowing width—8'2".

Angle of blade—25°.

200 RBH—

Cutting edge—1-8" x 120" x ½".

Shoes—2-7" x 12".

300 RBH Shoes 2-7" x 12".

V-Type Snow Plows

BURCH—Two new Ross models:

	RV6-80	RV6-87
Length, each side.....	11' 3"	11' 6"
Cutting edge, each side	4' 11 1/4"	5' 4 1/2"
Road clearance.....	8'	7"
Plowing angle in degrees.....	38	38
Outside width of moldboard at widest point.....	10' 6"	11' 4"
Height, at front.....	52"	52"
(With deflector).....	58"	58"
Height, at rear.....	56"	56"
(With deflector).....	92"	92"
Height of lift from road surface.....	15"	15"
Thickness of moldboard	10 ga.	10 ga.
Moldboard design, special conical		
Shoes, chilled iron...4 1/2 x 22 x 2" 4 1/2 x 22 x 2"		
Method of adjustment—self locking screw adjustment.		
Lifting device, hydraulic		
Push frame—selective		
—rear axle or front axle—rear frame or front frame with or without shock absorbing springs.		
Approx. weight, plow only.....	2400 lb.	2600 lb.
Approx. weight, with rear frame or rear axle hitch.....	3300 lb.	3500 lb.
Approx. weight, with front frame hitch...3100 lb.		3300 lb.

V-Type Snow Plows (Cont'd)

WAUSAU IRON WORKS—Various changes as follows (Numbers in parenthesis refer to notes in Powers' tables):

X32-45—

Designed for 1½-2 ton truck.
Weight—Plow only, 715 lb.

Weight—Plow with underframe hitch, 1482 lb.

Weight—Plow with pushframe, 1200 lb.

Moldboard—Cutting edge, 7'6".

Moldboard—Rear (top), 9'8".

Moldboard—Height (nose), 2'7".

Moldboard—Height (rear), 5'0".

Moldboard—Length (each side), 9'8".

Moldboard—Thickness, 12 ga. alloy steel.

Cutting edge—6" x 48" x ½".

No. and size of runners—3-4" x 15".

X-32W—

Designed for 2-3 ton truck.

Moldboard—Thickness, 12 ga. alloy steel.

Cutting edge—6" x 55" x ½".

X-41—

Designed for 2-5 ton truck.

Moldboard—Rear (top), 10'9".

Cutting edge—8" x 63" x ½".

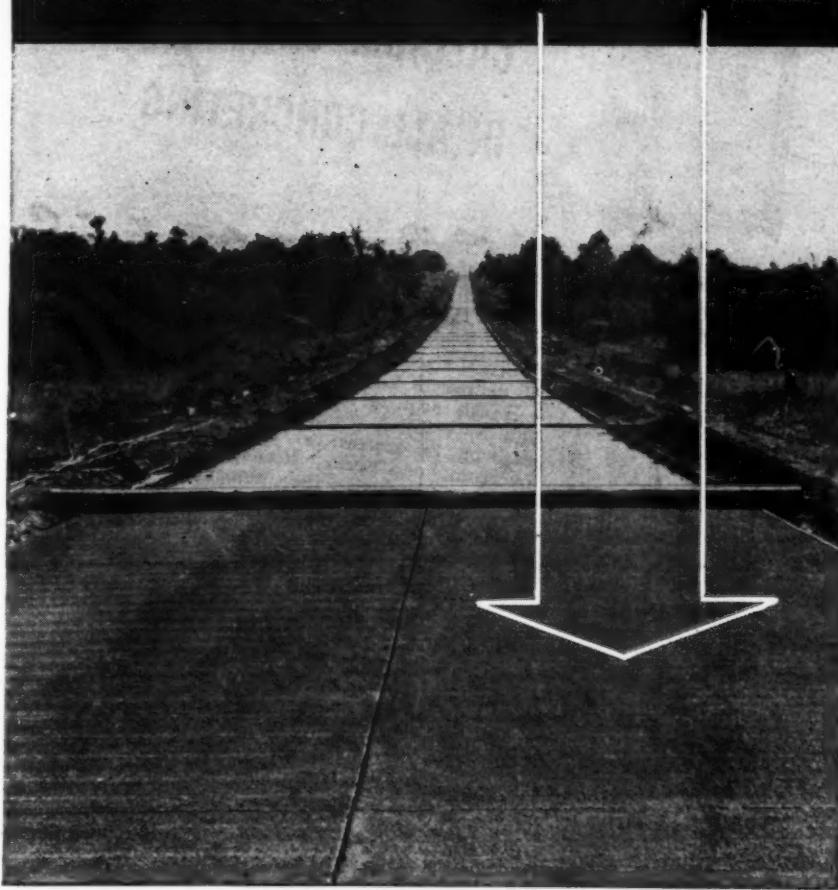
X-51—

Designed for 3-6 ton truck.

Moldboard—Rear (top), 10'9".

Literally, IMMERSION CURING

with SISALKRAFT BLANKETS



THE unretouched picture above of a newly laid highway tells more than anything we might say about concrete curing with Sisalkraft blankets. It shows the water in the original mix still retained, and the concrete comparable in strength with that obtained by immersion curing!

Only two men are needed to roll the Sisalkraft blankets in place after the concrete has been laid. After curing the Sisalkraft blankets are easily rolled up, ready to be used again. Much time and labor are saved.

Over 40 State Highway Departments approve Sisalkraft blankets for curing their concrete highways.

Two layers of asphalt make SISALKRAFT waterproof. Longitudinal and crosswise fibre reinforcement imparts amazing strength with flexibility!

Two layers of high wet strength kraft paper seal in the asphalt, preventing it from drying out. SISALKRAFT is a processed product—the result of scientific research.



Manufactured by SISALKRAFT, FIBREK, SISAL, SISALTAPE and COPPER-ARMORED SISALKRAFT

NO SLOWDOWN
IF YOU USE
CALCIUM CHLORIDE
IN ALL CONCRETING

BELOW 50 DEGREES

When the temperature drops from 70 degrees to 40 degrees, it takes twice as long for normal concrete to acquire safe weight-bearing strength. But by using 2 pounds of calcium chloride for each bag of cement, this difference in strength is overcome, and normal strength is attained in the same time as during the summer months.

Why waste this valuable time when the use of calcium chloride will compensate for the reduction in temperature and put you back on normal 70 degree summertime operating schedules for placing, finishing, removal of forms, and opening for use.

Concrete with calcium chloride has greater strength at all ages tested.

Use calcium chloride in all Portland Cement Concrete placed at 50 degrees Fahrenheit or lower. Get your copy of the new book, "Early Strength Concrete," explaining methods, amounts to use and results of tests by the National Bureau of Standards.

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CALCIUM CHLORIDE

FOR BETTER CONCRETE CONSTRUCTION

Cutting edge—8" x 64" x 1/2".
"Speed" 92—
Designed for 6-10 ton truck.
Moldboard—Rear (top), 11'11".
Moldboard—Height (rear), 6'5".
Moldboard—Length, 13'0".
"Speed" 88—
Designed for 6-10 ton truck.
Weight—Plow only, 2650 lb.
Moldboard—Rear (top), 11'5".
Moldboard—Height (rear), 6'3".
Moldboard—Length, 12'8".
X-150—
Designed for 3-5 ton truck.
Moldboard—Rear (top), 10'10".
X-150-W—
Designed for 3-5 ton truck.
Moldboard—Rear (top), 11'6".
X-250—
Designed for 5-8 ton truck (16).
Moldboard—Rear (top), 12'8".
X-350—
Designed for 8-10 ton truck (16).
Moldboard—Rear (top), 12'8".
X-450—

Designed for 10-12 ton truck (16).
Moldboard—Rear (top), 14'0".
XF-96 (Std.)—
Designed for 8-12 ton truck (16).
Moldboard—Rear (top), 12'7".
XF-90 (Std.)—
Designed for 6-12 ton truck (16).
Moldboard—Rear (top), 12'3".
XF-86 (Std.)—
Designed for 5-10 ton truck (16).
Moldboard—Rear (top), 11'8".
LD-30 (31)—
Designed for 30 class tractor (17).
Moldboard—Rear (top), 9'5".
LD-35 (31)—
Designed for 35 class tractor (19).
Moldboard—Rear (top), 10'6".
LD-35W (31)—
Designed for 35 class tractor (43).
Weight—Plow only, 4555 lb.
Weight—Plow with underframe hitch (44).
Moldboard—Cutting edge, 9'9".
Moldboard—Rear (top), 11'1".
Moldboard—Height (nose), 4'7".

Moldboard—Height (rear), 6'10".
Moldboard—Length (each side), 11'0".
Thickness—10 ga.
Cutting edge—3" x 83" x 1/2".
Plow lift—Type H.
Plow lift—Height, 16".
No. and size of runners, 3-10" x 15".
LD-50 (31)—
Designed for 50 class tractor (21).
Moldboard—Rear (top), 12'0".
35 Class (32)—
Designed for 35 class tractor (33).
Moldboard—Cutting edge, 8'0" and 9'2 1/2".
50 Class (32)—
Designed for 50 class tractor (35).
No. and size of runners—3-10" x 15".
75 Class (32)—
Designed for 75 class tractor (36).
No. and size of runners—3-12" x 15".
"RD-8" (32)—
Designed for RD-8 tractor (37).
No. and size of runners—3-12" x 15".
X51G—
Moldboard—Height (nose), 4'0".
Moldboard—Height (rear), 5'7".
Moldboard—Length (each side), 11'0".
Moldboard—Thickness, 10 ga.
Cutting edge—3" x 70" x 1/2".
Plow lift—Type H or M.
Plow lift—Height, 16".
No. and size of runners—3-6" x 15".
X-151WG—
Designed for motor grader.
Moldboard—Rear (top), 12'3".
V-PLOW SPECIFICATION FOOTNOTES
(19) For AC"K; Cletrac DG-DD, BGH & BDH Int. HD-7.
(21) Caterpillar RD7-D7; Cletrac DGH, DDH; Int. TD-14-TD18 Std.; AC-S-HD10 Std.
(27) Weight of plow only with hitch—3430.
(28) Weight of plow, wings and hitch, complete—6373.
(33) Caterpillar D4-R4; AC-M; Int. T9-TD9; Cletrac BD, BG Standard Gauge Tractor. AC-K; AC-HD-7; Cletrac DG-DD, BGH, BDH.
(34) Wide Gauge Tractors: Caterpillar D6 Std.; R4, D4 wide, AC-WK, HD7W, TD9, wide gauge.
(35) For DGH Cletrac, TD-18, TD14, standard gauge; RD-7, standard gauge; AC model "S" narrow gauge; AC model, HD10 standard gauge.
(36) For TD18 wide gauge; RD-7 wide gauge; AC model L; AC model, HD-14; HD10W, FD-FG Cletrac.
(37) For D-8 RD-8 tractor only.
(43) For TD-9 wide gauge.
(44) Complete with wings, 7200.

Snow Plow Wings

BURCH—Two new heavy-duty models:

	R6-3 10'	R6-4 12'
Moldboard material, steel	10 ga.	10 ga.
Length overall	10'	12'
Length at cutting edge	103 1/4"	127 1/4"
Height, inner end	24"	24"
Height, outer end	36"	38"
Reinforcement — Vertical	3 x 2 1/2 x 1/2 angles	
Horizontal, top electric welded box		
Top flanged—Bottom 1/2" Z Bar		
Approx. wt., wing moldboard only	530 lb.	630 lb.
Approx. wt. with attachments	2400 lb.	2600 lb.
Height of lift, front	48"	48"
Height of lift, rear	39"	9'4"
Wing braces, 2 used	Tubular	Tubular
Operation, hydraulic	Power	Power
Front or rear mounted..	Yes	Yes

New Equipment and Materials

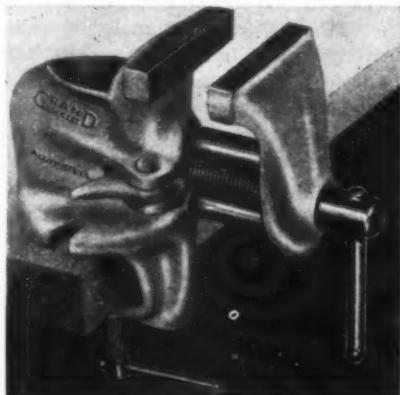
New Coated Lens for Surveying Instruments

A new coated lens for surveying instruments, which is claimed to give a 40% increase in brightness and greatly improve image contrast, has been announced by David White

Co., 315 W. Court st., Milwaukee 8, Wis. In the ordinary lens, it is stated that it is estimated there is a 43% light loss in an internal focusing telescope, commonly used in surveying. In the coated lens, light transmission is greatly increased, resulting in a brighter image—also a sharper image with greater contrast by reducing the haze caused by internal reflections. A bulletin on this new development may be secured by writing to the manufacturer.

New Machinist's Vise

A new "quick action" machinist's vise has been brought out by Grand Specialties Co., Grand Ave., Chicago 22, Ill. The vise is manually operated but eliminates running in or out the screw to close or open the vise. It is claimed that this new speed vise can be set and closed quickly by simply pushing on body of the free jaw, which slides in swiftly on ratchet screw and two precision guide rods and tightens with a turn of the han-



Grand 3 in. Quikset alloy-steel vise

idle. The vise is equipped with a trigger release pawl with $\frac{1}{4}$ -in. of thread which holds the hardened screw under spring tension. Vise is said to open instantly to full 3 in. by pressure of thumb or finger on trigger release after tension has been eased by single turn of the looseproof handle. The vise is then said to be ready, without further adjustment, for instant closing on any other work.

New Lubricator

A new lubricator having many novel features, that on actual tests, are said to have given sensational results, has been introduced by Balcrank, Inc., Cincinnati, Ohio. Chief among the many new features of this lubricator which went into quantity production early in September,

Built for--
HEAVY DUTY



The above contractor's-type body can take peak-load punishment day after day without whimpering. It is one of many MARION designs for 10-wheel conversion units.

MARION offers a complete line of standard and custom-built bodies for every hauling need. Each is equipped with oscillating cylinder and roller-type hydraulic hoist for dependability. The light weight and extremely low,

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MARION hoists assure
long life, economical
operation.

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and WASHING UNITS

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Elevators	Pulverizers	"GAYCO"
Sweepers	Feeders	Centrifugal
Screens	Spreaders	Air Separators
Wash Boxes	Kettles	
	Conveyors	

UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.

Canadian Representatives: F. H. Hopkins & Co., Ltd.
140 Canada Cement Co., Montreal, Que., Can.

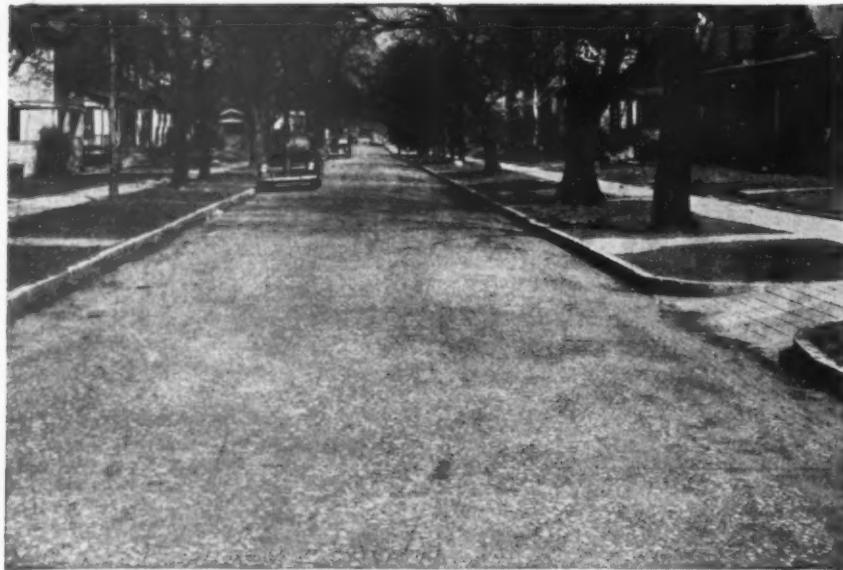


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ARE MADE in a complete line of
sizes to fit all standard compressed air
hammers.

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VULCAN TOOL MFG. CO.
QUINCY, MASS.



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● Thirty-seven years ago the BITUVIA road tar pavement shown above was installed. It has served these many years without any major maintenance expense, and will continue to serve for many more years.

BITUVIA is available in all grades to meet standard specifications. The application of BITUVIA requires a minimum of equipment and man-hours per mile—making it the logical material for wartime maintenance and construction.

PLASTUVIA Crack and Joint Filler

PLASTUVIA is a resilient filler which bonds firmly with concrete, brick or stone, thoroughly sealing cracks and joints against water damage and disintegration. PLASTUVIA "stays put" and remains elastic under years of the heaviest traffic and extremes of heat and cold. It will not flow in summer, nor chip out in winter.



Pocket-size manual giving specifications and complete information for applying BITUVIA and PLASTUVIA will be sent on request.

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Machinery Trailers
Built by
**LA CROSSE TRAILER
& EQUIPMENT CO.**
LA CROSSE WISCONSIN

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AEROIL PRODUCTS COMPANY
WEST NEW YORK, N.J.
Chicago San Francisco Dallas

is the exclusive "Padl Pak" tampering blade, which positively eliminates air pockets without the use of bleeder valves. This patented device "paddles and packs the grease as it pumps"—assuring 100% delivery of grease to the fitting at all times. Another feature is the "jiffy change" adapter, which utilizes a universal swivel as an integral part of the hose line—and permits adapter



"Minit" Lubricator

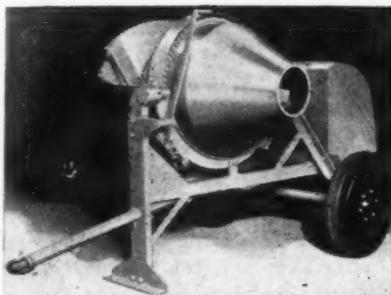
change in seconds to take care of button head, hydraulic or pin-type fittings. The all-weather construction of the "Minit" lubricator seals out rain, moisture, dirt and dust, while the 30 lb. capacity takes a full 25 lb. can of grease and pumps the container empty without a sputter. A special mounting bracket is provided as an accessory, which makes it possible to mount the lubricator right with any machine and be ready to lubricate any time, anywhere.

New Cement Batching Plant

A new portable twin-silo cement batching plant with storage capacity up to 1600 bbl., featuring unusual portability, has been developed by C. S. Johnson Co., Champaign, Ill. Plants of similar design in capacities of 761, 1044 and 1327 bbl. are also offered. The plants are constructed of all-welded units and can be erected without a crane. All bolt and nut assembly details are eliminated. The leg section on the overhead silo can pivot on a base plate mounted in the concrete footing. The pivot can then be utilized to tip the entire leg and silo assembly into place by means of a gin pole and a tractor winch. Other equipment used with this plant include the Johnson cement batcher and bucket elevator and screw conveyor with capacities of 300 bbl. per hour. The Johnson bin-gage indicates high or low level of cement in silo. The twin silo plant may be charged from box or hopper cars, or from trucks.

New 1/2 Bag Mixer

A new 3½-S tilting mixer has been brought out by The T. L. Smith Co., 2835 N. 32nd st., Milwaukee 10, Wis. The mixer is equipped with a Wisconsin air-cooled engine. High tension magneto and simple rope starter provides quick starting. Power is trans-



Mascot 3½-S Filter

mitted to the drum drive shaft by means of a high grade roller chain running at low speed on machine cut sprockets, all enclosed in the engine house. The house has a hinged cover that opens like the trunk of a motor car and makes every part of the engine easily accessible.

New Portable Lathe

A new portable brake drum lathe, adaptable for field service work, or in locations where time and labor can be conserved by bringing the lathe directly to the job, has been announced by Barrett Equipment Co., St. Louis, Mo. The outer end of the lathe shaft rests on an easily adjusted steady-rest, or outboard support to prevent off center deflection of the shaft because of the weight of the object being machined. The lathe on its adjustable stand, together with the steady-rest, are arranged on a well balanced, rubber-tired wheeled track to permit



New portable lathe



Extra Long . . . Extra Wide

Insley crawlers are extra long . . . extra wide . . . at no extra cost. The added surface area reduces ground pressure. Crawlers are individually controlled and self-cleaning. That's another reason why the Insley Excavator does things and goes places in tight spots and on any terrain—no matter how soft, rough or tough the going may be.

A limited number of Insley Ex-

cavators may now be obtained by civilian buyers upon authorization of WPB. For lower cost yardage on your job, see your dealer today about a new $\frac{3}{8}$ or $\frac{1}{2}$ -yd. Insley Excavator. Designed for use with five easily interchangeable attachments . . . shovel, crane, hoe, clamshell and dragline . . . crawler, rubber or rail mounted . . . gasoline, diesel or electric powered.



INSLEY MANUFACTURING CORP., INDIANAPOLIS 6, IND.

easy handling. When track is placed on the floor, the 6-in. diameter by 1½-in. wheels are raised from contact, thus giving firm support for the lathe and its work. The floor and track arrangement, not the lathe shaft, support the weight. Built on the principle of the internal boring bar, the lathe has a range of swing from 7-in. to 24-in., is equipped with rheostat speed control, operates on any 110-volt AC or DC outlet. For complete information write Barrett Equipment Co., 21st & Cass Ave., St. Louis 6, Mo.

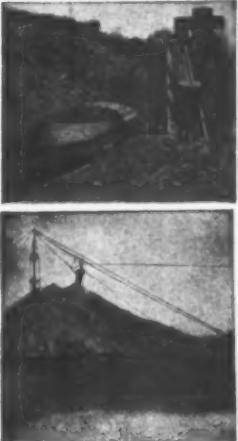
New Idling Device for Welder

To save gasoline and prolong engine life, a new mercury-type Idling Device which automatically shuts down the gasoline engine to idling speed 12 to 15 seconds after the operator has stopped welding has been announced by The Hobart Brothers Co., Troy, O. To bring the engine to normal welding speed, the operator merely strikes an arc. The idling device and governor are linked with the throttle in such a manner that the

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(Lower View) Sauerman Cableway digs reservoir.

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With one man at the controls, and with a relatively small expenditure of power, a Sauerman machine will dig, haul and automatically dump a large hourly tonnage of any class of earth or bulk material. Moreover, the first cost of the equipment is moderate and upkeep is simple.

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CONCRETE & BUILDING SPECIALTIES, Ltd.
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device can close the throttle without having to resist the governor action. When welding, the governor controls the engine speed without any interference from the idling device. The device can be made inoperative by opening an off and on toggle switch without affecting the welder or gasoline engine operating characteristics. The design is built around an ingenious mercury switch which closes instantaneously but has a 15 second delay in opening. This delay is obtained by causing the mercury to flow through a small orifice on the release stroke. The switch itself is totally enclosed in a stainless steel case and sealed under a pressure of pure hydrogen gas. This totally sealed construction makes the relay impervious to dirt and moisture conditions that are present in welder operation.

**With the
Manufacturers
and Distributors**

**W. E. Zipp Appointed Vice
President Ceco**

William E. "Bill" Zipp has been appointed vice president in charge of sales for the manufacturing division of Ceco Steel Products Corporation. He will have headquarters in the division's plant in Cicero, Ill. Mr. Zipp was manager of sales for Ceco's manufacturing division from June 1944 until his new appointment. He joined Ceco in 1933 to inaugurate the steel window division. Previously, he had wide experience in architectural construction and window fields.



New Galion Representative

Robert C. Monnett has been appointed district representative for the Galion Iron Works & Mfg. Co., Galion, O., for Wisconsin, Minnesota, Iowa, South Dakota, North Dakota and the Upper Peninsula of Michigan. Mr. Monnett served as maintenance engineer and later as division engineer, Division 3, Ohio State Highway Department, with headquarters in Ashland, O.

Bob Dunn Promoted by Macmillan Petroleum

Bob, for the past 5 years with Macmillan Petroleum Corporation has been named assistant to the general sales manager of the corporation's Ring Free oil division. He will make his headquarters at the company's New York office in the Rockefeller Center Bldg., and H. C. Akerberg, recently appointed general sales manager of the Ring Free oil division, will move to the Los Angeles headquarters at 530 West Sixth St. Dunn joined the Macmillan Co. in 1940, following a two year sojourn in Europe. Since 1941, he has been district manager of northeastern United States territory for the Ring Free division. He took over that job after a period on the road training new distributors and handling distributor appointment work.



Robert Dunn

D. A. Koehler Named Commodity Director for Insley

Donald A. Koehler has been appointed commodity director for the Insley Manufacturing Corp., Indianapolis, Ind. As commodity director, a newly-created post, Mr. Koehler will be responsible for coordination of procurement and production schedules. Before joining Insley he was for several years with the Chicago office of the Bureau of Yards and Docks as head of the procurement division for heavy-duty and automotive equipment. Prior to that time, he owned his own business, the Koehler Construction Co., Lincoln, Neb.



D. A. Koehler

Atlas Equipment Moves

The general offices and the repair service and rental department of the Atlas Equipment Corporation, of which Paul B. Reinhold is president and treasurer, have been moved to 635 Ridge Ave., Pittsburgh, Pa.

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For any trailer or semi-trailer with any make of fifth wheel



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PICK-UP STREET SWEEPERS

STREET FLUSHERS
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Midget $\frac{1}{4}$ " or $\frac{3}{8}$ " Socket Set in Case...\$19.85
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I—Foote Paver 3000.00
I—Huber Roller, Gas, 10 ton (three
wheel) 1250.00
3—Steam Tandem Rollers.....(Prices vary)
I—Barber Asphalt Plant 2000 lb. box.....15000.00
I—Acme stone crusher, screen and
elevator equipped with McCormick-
Deering power unit.....1200.00
3—Euclid, 10 cu. yds., side dump
crawler wagons (each) 500.00
I—Buckeye Ditcher, Model 120.....4000.00
I—Backfiller, Model F.....900.00
I—Austin Ditcher 2500.00
I—Barber-Greene Ditcher 2500.00

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FOR SALE

FWD Truck, 1941, excellent, run 24,000 miles; Garwood Dump Body, 150 H.P. Cummins Diesel engine; all controls for snow plow, with or without snow plow. Bargain.
Brooks Load Lugger, late model CH-200, including 3 cu. yd. buckets; \$600.00.
Iowa Portable Crushing Plant, late model R.B. 18" x 24", Caterpillar Diesel engine, folding elevator, screen. \$5000.00.
Good Roads Portable Crushing Plant, late model R.B. 12" x 20", 60 H.P. LeRoi Gasoline engine, folding elevator. \$2500.00.
Tellsmith-Wheeler 15" x 38", R.B. Rebuilt. \$3200.00.
Pioneer, R.B., 9" x 16", v-belt, A.C. engine. Portable. \$900.00.
LeRoi 315 cu. ft.-2-stage Portable Compressor. Overhauled. \$1750.00.
Ingersoll-Rand X-71 Wagon drill, rebuilt, late model. \$750.00.
Parsons Ditcher, #21. Good order. \$1750.00.
P. & H. #206, 40-ft. boom, $\frac{1}{2}$ yd. Dragline bucket. \$2800.00.
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40-45, mechanical merchandising background. Established distributing company in competitive mechanical field, requires man having experience in supervision and sales promotion, selling construction equipment; supplies engines and power units. Prefer man having practical knowledge of internal combustion engines. Salary and bonus, location eastern Pennsylvania. State specifically age, earnings, last five pre-war years, type of industries followed.
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WANTED CONSTRUCTION SUPERINTENDENT

NORTHERN CONSTRUCTION CO.
GRAND FORKS, N. D.

Walter Parrish Appointed Chief Engineer

Walter Parrish has been appointed chief engineer of Rogers Diesel & Aircraft Corp., New York, N. Y. He takes charge of the engineering, research and development facilities of the parent company, as well as aiding in the formulation of engineering plans for the entire organization, which includes the Edwards Co., Sanford, N. C.; Hill Diesel Engine Co., Lansing, Mich.; Ideal Power Lawn Mower Co., Lansing, Mich.

Gilbert Soler Promoted by Timken

Gilbert Soler, Superintendent of the Quality Control Departments at Steel Tube Division of the Timken Roller Bearing Co., Canton, O., has been named Assistant General Superintendent of the division. Starting with the company in 1931 as a Refractories Engineer, Soler was made Manager of Research in 1934 and in 1937 was promoted to Manager of Research and Mill Metallurgy, which position he held until 1943, when he became Superintendent of Quality.

Hewitt Rubber Corp. Acquires Robins Conveyors Inc.

Thomas Robins, Jr., president of Hewitt Rubber Corporation of Buffalo, N. Y., recently announced that the company has acquired a controlling interest in Robins Conveyors Inc., of Passaic, N. J. In addition to directing the management of Hewitt since 1936, Mr. Robins has been chairman of the Robins Conveyors executive committee for the past five years; there has been a close association between the two companies.

Robert F. Nelson Named to LeTourneau Executive Staff

In order to free R. G. LeTourneau of numerous business and administrative duties to permit him to devote more time to research and engineering activities, R. G. LeTourneau, Inc., Peoria, Ill., has announced the addition of Robert F. Nelson to its



R. F. Nelson

executive staff as vice president and assistant to the president. Mr. Nelson former vice president and director of the Arma Corporation, Brooklyn, N. Y., brings to LeTourneau an extensive background of engineering, production and administrative experience. He will work closely with Denn M. Burgess, Executive Vice President, and Merle R. Yontz, Vice President and Treasurer. One of Mr. Nelson's first assignments will be to assist in establishing a new LeTourneau plant in England this fall.

New Vice President in Charge of Sales for Republic Steel

The election of N. J. Clarke as senior vice president and J. M. Schlendorf, vice president in charge of sales, of Republic Steel Corporation, has been announced by T. M. Girdler, board chairman, and C. M. White, president, following the directors' meeting of the corporation. Mr. Clarke has been vice president in charge of sales for Republic since September, 1930, shortly after the corporation was formed, and will be succeeded in that position by Mr. Schlendorf, who has been assistant vice president in charge of sales.

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HIGHWAY TORCHES

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EMBURY MFG. CO., WARSAW, N.Y.

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and Ice Removal **BLADES**

Proved record
of superior performance.
Made of specially developed
steel to withstand severe
service conditions.

FOR ALL TYPES AND MODELS
OF SNOW FLOWS
Various widths, lengths, thicknesses—flat or curved—standard or special—punched ready
to fit your machine.

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ICE BLADE

Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

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MANUFACTURING
COMPANY
ESTABLISHED 1854
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Lord Baltimore Hotel
BALTIMORE, MARYLAND

Standard Specifications for Highway Bridges

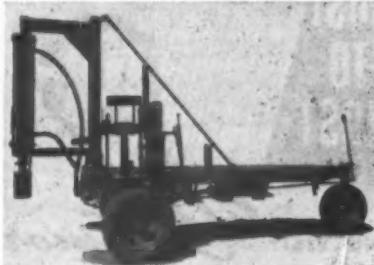
The 1944 edition of this book is a complete presentation of the specifications adopted by the Association. In four main Divisions, with 72 subordinate Sections, are covered all details of General Provisions, Construction, Design and Materials. Four Appendices carry tables of moments and shears, steel column formulas and graphs, a chart of truck, train and equivalent loadings and a diagram of permissible unit stresses for rectangular concrete columns.

262 pages, 6" x 9", cloth bound, \$2.00 postpaid.

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